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WATERSHED CHARACTERISTICS AND CONDITIONS INVENTORY

PYSHT RIVER AND SNOW CREEK WATERSHEDS

By

Jones and Stokes Associates

TIMBER FISH & WILDLIFE

May 1991

Watershed Characteristics and Conditions Inventory

Pysht River and Snow Creek Watersheds

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INTRODUCTION

The Ambient Monitoring Steering Committee (AMSC) of the TFW Cooperative Monitoring, Evaluation and Research Committee (CMER) has contracted with Jones & Stokes Associates to conduct a Watershed Characteristics and Conditions Inventory (WCCI) on six watersheds within the state. The goal of the project is to provide information necessary to interpret the influence of watershed conditions on the characteristics of stream channels. This WCCI has involved the collection and compilation of information related to the natural characteristics and management-affected conditions of the designated watersheds. Stream surveys have previously been completed by AMSC trained crews on all or portions of the streams within these watersheds.

The six watersheds have been divided into three groups: West Slope Cascade Mountains, Olympic Peninsula, and East Slope Cascade Mountains group. This report presents the results of the WCCI for the Olympic Peninsula Group, consisting of the Pysht River and Snow Creek watersheds.

Part 1 of this report describes the methods of data collection and results of the inventory for the Pysht River watershed; Part 2 presents this information for Snow Creek. Part 3 consists of a comparative summary and conclusions regarding the inherent stability and harvest intensity within the study areas. A series of l:24,000-scale maps and overlays, with attributes described on Dbase data files, accompanies this report.

PART 1. PYSHT RIVER WATERSHED

The Pysht River is located approximately 28 miles west of Port Angeles on the northern edge of the Olympic Peninsula. The 45.7-square-mile watershed lies within Sections 2-11 of Township 30 N, Range 11 W; Sections 1-6 of Township 30 N, Range 12 W; Section 1 of Township 30 N, Range 13 W; Sections 3-10, 15-21, and 26-34 of Township 31 N, Range 11 W; Sections 3, 4, 9-16, 19-36 of Township 31 N, Range 12 W; Sections 25 and 36 of Township 31 N, Range 13 W; Section 35 and 36 of Township 32 N, Range 11 W; and Section 36 of Township 32 N, Range 12 W. The Pysht River flows directly into the Strait of Juan de Fuca.

Methods

Watershed Characteristics

Climate

Elevation. The Pysht River watershed boundary was delineated on the Pysht, West of Pysht, Ellis Mountain, Snider Peak, Deadmans Hill, and Lake Pleasant USGS 7 1/2 minute topographic maps. Basin relief was calculated by determining the difference in elevation between the basin mouth and the highest point on the watershed divide. Mean elevation was determined by measuring the area of the entire watershed, then measuring the area above mid-basin contours. The mean elevation is the contour elevation above which 50% of the watershed area is located.

Precipitation. Precipitation information was obtained from USGS Climatedata disks. The disks were searched to locate weather stations within 20 miles of the Pysht River and within the elevational range of the watershed. Three stations met the criteria: Clallam Bay at 30 feet; Elwha Ranger Station at 360 feet; and Sappho at 760 feet elevation. A summary of average monthly and annual precipitation and snowfall for these stations is included in Appendix A.

Average monthly precipitation and snowfall data from the three stations were weighted on an area basis to determine monthly precipitation for the Pysht River watershed. The area weighting was accomplished by drawing lines along the contour elevations halfway between the elevations represented by each station. Each station was assumed to represent the watershed area within these lines. A weighting factor was then assigned based on the percentage of the watershed area represented by each station.

The 2-year, 24-hour precipitation event for the watershed was determined by consulting the NOAA Precipitation Frequency Atlas (1970). Due to the large scale (1 inch = 20 miles) of the NOAA map, the entire basin was represented by three isopluvials. The 2-year, 24-hour precipitation for the basin is the area-weighted average of the three isopluvials.

Air Temperature. Air temperature information was obtained from the USGS Climatedata disk. Because daily temperature values were not available, average monthly values were used. Average monthly maximum and minimum temperatures for Clallam Bay, Elwha Ranger Station, and Sappho were weighted on an area basis in the same manner as the precipitation data to determine temperatures for the Pysht River watershed. A summary of temperature information for the three stations is included in Appendix A.

Water Temperature. No water temperature data is available for the Pysht River.

Geology. The Geologic Map of the Pysht Quadrangle (Gower 1970 - original scale 1:62,500) and Geologic Map of the Olympic Peninsula (Tabor and Cady, 1978 -

original scale 1:100,000) were reproduced at a scale of 1:24,000 to construct the Geology Overlay of the watershed. The mapping unit boundaries displayed on the Geology Overlay should be viewed with the original scale of these maps in mind. The Geology Overlay merely provides a general characterization of the underlying geology of the watershed, as opposed to a detailed geologic investigation.

Soils. The Soils Overlay was constructed using the State Soil Survey Township Soils Maps (original scale 1:24,000). Information from the State Soil Survey Report for the Ozette district (WDNR, 1974) was then incorporated into a Dbase database. The database includes acreage of each mapping unit, soil name, natural and disturbed stability ratings, road-related erosion hazard, timber harvest-related erosion hazard, and site index. These parameters are explained in the database description included in Appendix C.

Hydrology

Drainage Network and Basin Dimensions. Stream orders were completed for the watershed using the standard method developed by Strahler (1964). Unbranched, blue-line tributaries are designated as first-order streams on the 1:24,000 scale USGS topographic base maps. Second-order streams are designated where two first-order streams flow together, and third-order streams are designated when two second-order streams join. Drainage density was computed by measuring the total length of streams in each order and dividing by the watershed area.

Watershed area was measured with a Planix planimeter. The fifth-order watershed was divided into five third-order sub-basins. Basin length was measured from the mouth to the drainage divide following the main channel. Basin width was measured at the midpoint of the channel, perpendicular to the direction of flow. Relief ratio was calculated as basin relief divided by the length of the basin (Dunne and Leopold, 1974).

Flow. The Pysht River is ungaged; therefore streamflow was estimated using methods described by Amerman and Orsborn (1987) for the Olympic Peninsula. First, average annual flow was estimated. Four different equations applying to the Northern Coastal Zone of the Olympic Peninsula were tested to estimate average annual flow (QAA) as either a function of basin area, annual supply (average annual precipitation x basin area) or basin energy (basin area x relief). The average annual flows estimated by the equations were tested against a coefficient suggested by Amerman and Orsborn (1987) and compared to average annual flows of nearby, gaged streams to select the "best" average annual flow estimate. Equation 10-5 in Amerman and Orsborn (1987), which estimates average annual flow as a function of annual supply raised to the first power, provides the best estimate of QAA for the Pysht River.

According to Amerman and Orsborn (1987), streamflows can be estimated for an ungaged basin by developing ratios of characteristic flows from a nearby, gaged stream. Gaged streams in the Northern Coastal Zone of the Olympic Peninsula include the Hoko River, with 19 years of record, and the East Twin River with 12 years of record. The Hoko River is located approximately 10 miles west of the Pysht River. The 51.2-square-mile drainage area is similar in size to the 45.7-square-mile Pysht River, but the average annual precipitation of 124 inches is much higher than the 80 inches received by the Pysht River watershed. The East Twin River is located approximately 8 miles east of the Pysht River. While the 14-square-mile drainage area is much smaller than the Pysht River, average annual precipitation is similar at 90 inches.

The seven-day, two-year average low flow (Q7L2), seven-day, twenty-year average low flow (Q7L20), and one-clay, two-year average flood flow (Q1F2) were calculated for the Pysht River using the ratios of these characteristic flows for both the Hoko and East Twin Rivers. Equation 7-10 in Amerman and Orsborn (1987) was then used to test which of the gaged streams provided the best flow estimates for the Pysht River watershed. Using this equation, the East Twin River was selected as most representative of streamflow conditions on the Pysht River.

Flow duration curves were developed to represent mean, maximum, and minimum conditions. The mean flow duration curve was developed by assuming that Q1F2 is exceeded 0% of the time, QAA is exceeded 32% of the time, Q7L2 is exceeded 97% of the time, and Q7L20 is exceeded 100% of the time. The maximum flow duration curve uses the one-day, fifty-year average flood flow (Q1F50) for the 0% exceedance flow and a maximum average annual flow for the 32% exceedance flow. The minimum flow duration curve uses the one-day, 1.01-year average flood flow for the 0% exceedance value and a minimum average annual flow for the 32% exceedance value. These additional flow events were calculated for the Pysht River using the ratios presented in Table 7-3 of Amerman and Orsborn (1987) for the East Twin River. All curves use Q7L20 as the 100% exceedance flOW.

Monthly flows were estimated by using the ratio of monthly to average annual flows for the East Twin River. Maximum, mean, and minimum monthly flow estimates were generated by multiplying the calculated ratios by the estimated average annual flow for the Pysht River. One standard deviation above and below the mean was also calculated to display the flow variability.

Existing Studies. Local land managers, the Jamestown Klallam Indian Tribe, and the Northwest Indian Fisheries Commission were contacted to determine whether any instream flow or other pertinent studies have been conducted on the Pysht River.

Geomorphology

Slope Classes. The watershed was stratified into slope classes based on the spacing of contour lines on 7 1/2 minute USGS maps. Slope classes were: 0% to 5%; 5% to 30%; 30% to 65%; 65% to 90% and greater than 90%. A key was developed which depicted the 40-foot contour interval for 5%, 30%, 65%, and 90% slopes. The Slope Class Overlay was manually constructed by moving the key around on the map to visually identify areas in each slope class. The minimum size of the delineated areas is 5 acres.

Channel Profile. A channel profile of the mainstem was constructed by measuring the length of the channel between each 40-foot contour line on the USGS 7 1/2 minute topographic map. Channel slope was then calculated by dividing the rise in elevation by the channel distance. Channel slope was calculated for each valley segment type, as described in the following section.

Valley Segments. Valley segments were identified using the methodology developed by Cupp (1989). Valley segments identified during the AMSC/NWIFC stream survey of 1989 were verified using the channel profile, Slope Class Overlay, and 1990 1:12,000 scale aerial photos.

Watershed Conditions

Vegetation

Dominant Species and Timber Harvest Intensity. Major landowners within the Pysht River watershed were contacted to obtain timber stand species composition, age, and stand density. The Washington Department of Natural Resources (WDNR), Olympic National Forest, Merrill and Ring, Cavenham Timber, Bloedel Timberlands Development, Inc., ITT Rayonier, Inc., and Rayonier Timberlands supplied timber stand maps and inventory data.

The WDNR supplied stand maps at 1:24,000 scale from their GIS system timber stand inventory. Dominant and subdominant tree species and year of origin was available for all stands. Stand density information for many of the stands was in terms of basal area and average diameter at breast height (dbh), rather than trees per acre. In these cases, trees per acre (tpa) was calculated by dividing basal area by the area occupied by the average tree diameter.

The Soleduck Ranger District of the Olympic National Forest also supplied vegetation information on 1:24,000 scale maps produced by a GIS system database. Age class was supplied for all stands on National Forest lands, but tree species and stand density were not available. Dominant species was estimated by aerial photo interpretation and comparison to nearby stands. Trees per acre was indicated as "not available" in the database.

Stand information on lands managed by Merrill and Ring was presented on 1:24,000 and 1:12,000 scale maps. Dominant and subdominant tree species and year of origin was available for all stands. Merrill and Ring also supplied stand density (tpa) estimates based on the year of origin of each stand.

Cavenham stand inventories were made available on maps (scale: 1" = 1,000 feet) which displayed dominant and subdominant tree species, year of origin, and percentage of fully stocked. Trees per acre was estimated using 300 tpa as 100% stocked.

Bloedel Timberlands also produced stand maps (scale: 1" = 1,000 feet) to display dominant and subdominant tree species and year of origin. Stand density was calculated from the basal area and average tree diameter supplied for each stand.

Stand maps (scale: 1" = 1,000 feet) were also supplied by ITT Rayonier and Rayonier Timberlands. Dominant and subdominant tree species and year of origin was available for all stands. Percentage of fully stocked was available for most of the Rayonier Timberlands stands, but tpa was unavailable for the IT]? Rayonier stands.

Stand maps supplied by the landowners were redrafted onto mylar overlays. Some difficulty was encountered in precisely matching section lines on the maps supplied by the landowners with those on the USGS quadrangles. Accuracy of the stand lines is estimated to be within 40 feet horizontal distance of actual stand boundaries.

Vegetation information for 8% of the watershed was interpreted from 1990 1:12,000 scale aerial photos. This includes the pasture and residential areas in the valley bottom and small tracts of timber land. Stand composition, age, and density were determined by comparing these stands to adjacent stands for which information had been supplied by the landowner.

The Vegetation Overlays consist of a series of numbered cells which are keyed to a Dbase database that contains information on cell acreage, dominant and subdominant species, year of origin, and trees per acre. Year of origin, rather than stand age, was entered into the database in order to avoid the need to cross-reference to the year of inventory. The acreage of the stands reported in the database is the gross acres. "Ribbon acres" of roads within the stands have not been subtracted out.

Also included in the database is locational information, including water resource inventory area (WRIA), subwatershed, legal description, ownership, and the original identification number assigned by the landowner. The comments section in the database identifies stands for which vegetation information was interpreted from aerial photos, or stand density was estimated or unavailable, as described above.

Riparian Condition. The condition of riparian vegetation along the mainstem of the Pysht River was given special scrutiny during this inventory. Riparian vegetation species and age were determined from the mouth upstream to RM 16.4.

Tree species and age were obtained from the timber stand inventory supplied by the landowner. Where the riparian vegetation differed significantly from that of the overall stand (such as where a buffer was left within a recent clearcut), dominant tree species and age was estimated using 1990 aerial photos.

The length of stream corridor occupied by a given stand was measured on the Vegetation Overlay. Stream corridors which had different age stands on either bank were assigned half of the total stream length to each stand.

The riparian area condition (RAC) rating was then calculated by weighting the age of each riparian timber stand by the length of stream corridor occupied. For example, a RAC rating of 100 indicates that the entire length of stream corridor contains 100-year-old trees, while a rating of one means that the entire stream corridor contains one-year-old trees.

Disturbance History

Roads. Road locations in the watershed were determined using 1:12,000 scale 1990 aerial photos and maps supplied by landowners. During field review, roads were divided into four classes: state highway, main-haul-paved (paved or gravel-surfaced), arterial gravel-surfaced, and temporary spurs. A road overlay was then created. Road lengths in each class were measured; road density was calculated as the length of road (in miles) divided by the watershed area (in square miles).

Mass Wasting. Landslides were inventoried using 1990 aerial photos and the 1989 AMSC/NWIFC stream survey. For the purpose of this general inventory, landslides are defined as areas of active or recently active mass wasting larger than 1 acre in size. The location of mass wasting areas is shown on the Miscellaneous Features Overlay. The Miscellaneous Features database (Appendix E) lists each mass wasting area, acreage involved, year of origin, condition, source of information, and comments for each feature.

Fires, Floods, and Other Disturbances. Local land managers and the Jamestown Klallam Indian Tribe were contacted to obtain information on past disturbances, including fires and floods.

Land and Water Use

Dams, Mining, Etc. Aerial photos were used to check for past or active dams and mining activities affecting the basin. Most of the gravel pit locations were indicated on the timber stand inventory maps supplied by the landowners and included in the Vegetation Overlay and database. Additional gravel pit locations were determined from aerial photos.

Miscellaneous Features. The location of lakes and wetlands was identified from 1990 1:12,000 scale aerial photos. Lakes and wetlands are included in the Vegetation Overlays and Vegetation database.

Results

Watershed Characteristics

Climate

Elevation. Mean elevation of the basin is 580 feet. Elevation ranges from sea level at the mouth to 2,650 feet on Ellis Mountain. Net relief is 2,650 feet.

Precipitation. Monthly precipitation and depth of snowfall is presented in Table 1 and Figure 1. Average annual precipitation for the watershed is 80.3 inches and

Table 1. Summary - Pysht River Watershed Climate

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (inches)	12.0	10.1	8.1	5.2	2.9	1.9	1.5	1.8	3.4	7.7	11.95	13.28	80.3
Snowfall Depth	9.7	2.3	2.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.1	21.9
Maximum Temperature (degrees F)	42	46	50	56	62	67	72	72	68	58	48	43	58
Minimum Temperature	31	33	34	37	41	46	49	50	47	41	36	33	40

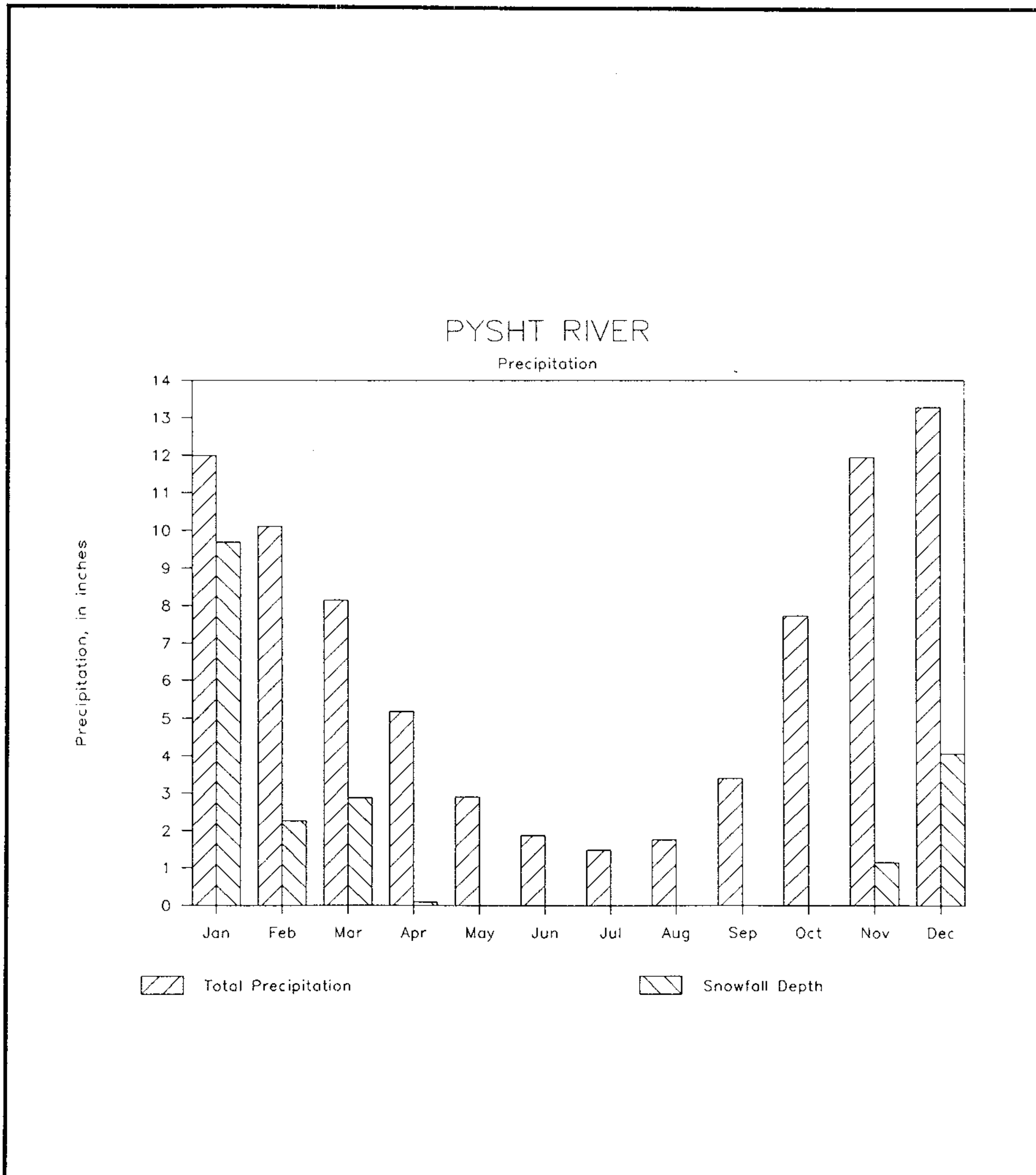

Figure 1. Monthly Precipitation and Snowfall Depth Calculated for the Pysht River Watershed

average annual depth of snowfall is 21.9 inches. The snowfall depth does not reflect actual accumulation of the snowpack on the ground, but rather, the sum of individual snowfall events.

Air Temperature. Average maximum and minimum monthly temperatures are presented in Table 1 and Figure 2. The average annual maximum temperature is 58°F and the average annual minimum temperature is 40oF.

Water Temperature. No water temperature data for the Pysht River was available.

Geology. Table 2 displays the geologic makeup of the watershed as described by Gower (1970), and Tabor and Cady (1978). Marine sedimentary rocks underlie the majority of the basin. Deposited while the present-day Olympic Peninsula was submerged beneath the ocean, the Aldwell, Lyre, Twin River and Clallam formations date from the upper Eocene to middle Miocene ages. These formations consist primarily of marine sandstone, siltstone and conglomerate.

The oldest formation in the watershed is the Crescent formation, which dates to the early to middle Eocene Age. Submarine eruptions resulted in the basalt pillow lava, flow breccia, massive flows, and tuff breccia which underlie the flanks of Ellis Mountain in the headwaters of the Pysht River watershed.

By the middle of the Miocene Epoch, about 15 million years ago, most of the Coast Range region had emerged from the Pacific. Recession of the continental and alpine glaciers in more recent times has left glacial outwash and till deposits in the valley bottoms and scattered across the lower slopes of the basin. Relatively young, unconsolidated alluvial and marine beach deposits are located in the valley floodplain and tidal flats at the mouth of the basin.

Soils. The Soils Overlay and database display the location and properties of soils within the watershed. In an undisturbed state, 38% of the watershed contains soils rated as stable and 61% of the watershed contains unstable soils (Table 3). However, after disturbance by road construction or landings and/or by timber harvesting, the soils on only 5% of the watershed are rated as stable, while 94% of the watershed contains unstable or very unstable soils.

The hazard for accelerated erosion of cut slopes, fill slopes, or sidecast material is rated as moderate on 9,792 acres (33%) and severe on 17,867 acres (61%). None of the watershed was rated as having a slight hazard of accelerated erosion related to roads. Area unsuitable for road construction amounts to 1,623 acres. The timber harvest-related erosion potential is rated as low on 11,183 acres (38%) and high on 17,867 acres (61%), with none of the watershed having a moderate potential. Area unsuitable for timber harvest amounts to 232 acres. These ratings have been developed by the WDNR (1974) for the Ozette district. They are explained in more detail in Appendix C.

Table 2. Geologic Mapping Units within the Pysht River Watershed

Unit/Symbol	Description	General Category	Acres	Percent
Qal	Quaternary alluvium	Unconsolidated	1,516	5
Qls	Quaternary landslide debris	Unconsolidated	19	<1
Qgd	Quaternary glacial drift	Unconsolidated	2,385	8
Tc	Clallam formation	Sedimentary rock	997	3
Ttrl, Ttrm, Ttrs, Ttru	Twin River formation	Sedimentary rock	21,376	73
Tlc	Lyre formation	Sedimentary rock	508	2
Tal	Aldwell formation	Sedimentary rock	1,535	5
Teb	Crescent formation	Volcanic rock	946	3

Table 3. Soil Stability Characteristics within the Pysht River Watershed

Condition	Natural Stability	Disturbed Stability
Stable	11,183 (38)	1,414 **(5)**
Unstable	17,867 (61)	23,520 (80)
Very Unstable		4,116 (14)
Not Rated[1]	232 (1)	232 (1)

Includes beach and tidal fiats.

Note: Expressed in acres and percent of watershed area. Ratings are from the State Soil Survey Report for the Olympic Peninsula (WA DNR 1974).

Site index classes for the watershed are displayed in Table 4. Site index is a designation of the quality of a forest site based on the height of the tallest trees in a stand at 50 or 100 years of age. The site index for the majority of the watershed applies to western hemlock stands and ranges from 80 to 119, with an average of 104.

Hydrology

Drainage Network and Basin Dimensions. The Pysht River is a fifth-order stream with a watershed area of 29,282 acres. Two overlays were constructed to display the watershed boundaries and stream orders. The watershed contains 34.5 miles of first-order streams, 15.3 miles of second-order streams, 17.1 miles of third order-streams, 2.6 miles of fourth-order stream, and 7.8 miles of fifth-order stream. Drainage density for the 45.7-square-mile watershed is 1.7 miles per square mile.

The watershed has an eastward orientation. Basin length is 56,000 feet and basin width is 30,500 feet. The relief ratio is 0.05.

Flow. As described in the Methods section, streamfiow data for this ungaged basin was estimated using gaging data from the East Twin River. Monthly flow data computed for the Pysht River is provided in Table 5 and Figure 3. The mean, maximum, and minimum monthly flows were computed to display the flow variability. Highest flows occur during November through March, which is also the period of highest streamflow variability. Lowest flows occur from July through September.

One actual discharge measurement was obtained for the lower mainstem of the Pysht River for comparison with the calculated flows. Discharge was measured during the TFW Level 2 survey in October, 1989. The measured value of 106 cfs is within one standard deviation of the calculated mean October streamflow of 130 cfs.

Average annual flow is estimated at 220 cubic feet per second (cfs). This translates to an average annual runoff of 4.8 cfs per square mile. The two-year flood flow was estimated to be 2,024 cfs. Figure 4 displays the mean, maximum, and minimum flow duration curves developed for the Pysht River.

Existing Studies. Stream surveys have been conducted on portions of the mainstem, Green Creek, and the South Fork Pysht River in a joint effort involving the University of Washington Center for Streamside Studies, the Northwest Indian Fisheries Commission (NWIFC), and the Jamestown Klallam Indian Tribe. The crews collected information on habitat unit distribution, channel substrate, habitat modifiers, and riparian vegetation according to a procedure described in the Timber/Fish/Wildlife Stream Ambient Monitoring Field Manual (Ralph, 1989). The stream surveys were conducted between August and October of 1989.

The stream surveys were followed by a pilot "Level 2" survey conducted by the University of Washington Center for Streamside Studies and NWIFC under the direction

Table 4. Site Index for the Pysht River Watershed

Index Species	Site Index	Acres	Percent of Watershed
Douglas-fir	117	23	<1
Western hemlock	80-89	482	2
	90-99	992	3
	100-109	3,224	11
	110-119	23,499	80
Red alder	90	830	3
Sites with no developed soils		232	

Table 5. Estimated Monthly Flows for the Pysht River, Based on E. Twin River Gaging Data

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annum
Maximum	348	623	836	744	704	541	312	154	86	42	31	51	275
+1 s.d.	229	486	631	700	524	49I	273	139	64	37	22	40	262
Mean	130	328	460	543	392	348	213	132	48	29	18	26	220
-I s,d.	31	172	286	389	260	205	154	84	33	38	11	15	178
Minimum	42	I32	231	3t2	253	143	139	79	33	15	11	15	147

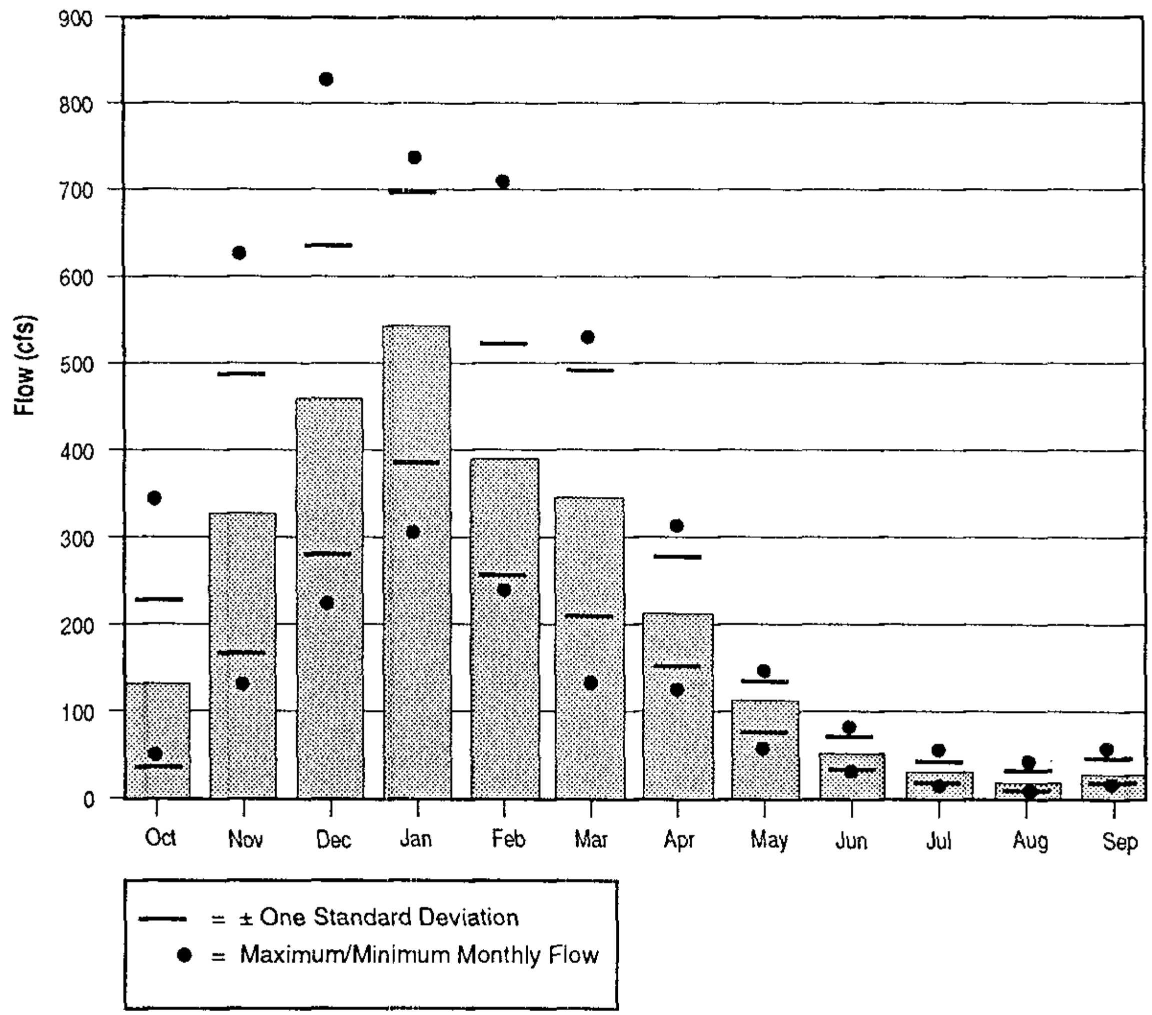

Figure 3. Estimated Monthly Stream Flow for the Pysht River

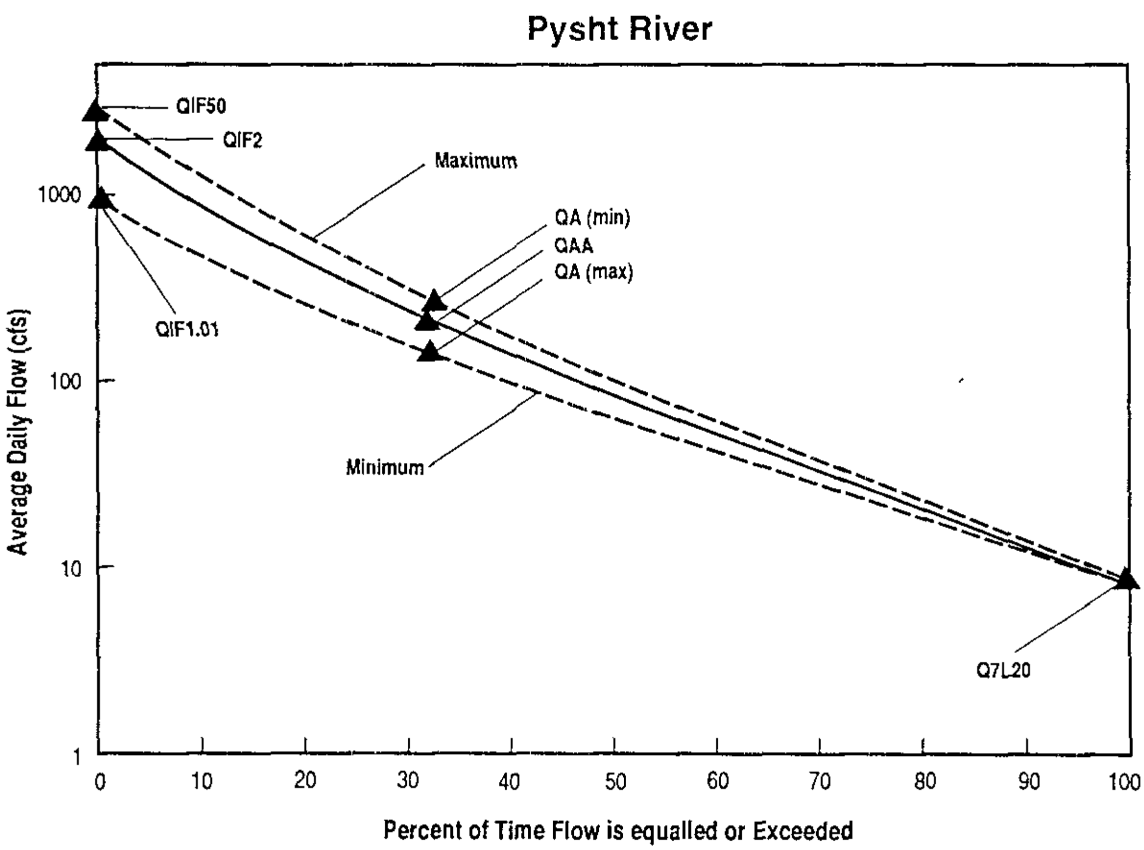

Figure 4. Estimated Maximum, Mean and Minimum Duration Curves for Pysht River

of the TFW Ambient Monitoring Steering Committee. The Level 2 project involved a survey of the channel cross section and thalweg profile at nine sites on the mainstem, South Fork, and Green Creek. Scour chains and bead monitors were installed to monitor scour and fill at each site. Crest gages were also installed at five locations to monitor peak flow levels. The location of these Level 2 sites is shown on the Miscellaneous Features Overlay. Preliminary data analysis by Steve Ralph indicates that substantial channel changes occurred between the initial survey in October of 1989 and follow-up monitoring in the fall of 1990 (Ralph, pets. comm.).

Rick Klinge, TFW Biologist for the Makah Indian Tribe, has sampled spawning gravels in the Pysht River. He found 27% sand (3.35 - 0.106 mm) in a sample taken near the confluence of Green Creek in the summer of 1989 (Klinge, unpublished report). This was twice the level of fines from gravel samples collected on the Clearwater River. Additional spawning gravel sampling in the Pysht River basin will begin in the summer of 1991 (McHenry, pers. comm.).

Return rate, escapement and harvest rate for hatchery and wild steelhead has been monitored on the mainstem and South Fork Pysht River since 1983 by the Washington Department of Wildlife (WDW, 1988). The Jamestown Klallam Tribe has conducted electroshocking surveys and monitored stream temperature in the South Fork Pysht River (Lichatowich, pers. comm.).

Geomorphology

Slope Classes. The Slope Overlay displays the distribution of slope classes in the watershed. The acreage of each cell on the overlay, according to slope class, is provided in Appendix B.

Table 6 lists the acreage of land in the slope classes. Nearly 60 of the watershed has gentle slopes under 30%. Forty percent of the watershed has moderately steep slopes between 30% and 65%, and only 1% of the basin includes steep slopes greater than 65%.

Channel Profile. The channel profile is displayed in Figure 5. Data used to develop the profile are contained in Appendix B. A typical pattern of increasing slope from mouth to headwaters is exhibited by the channel.

Valley Segments. The distribution of valley segment types on the mainstem, South Fork, and Green Creek is shown on the Valley Segment Overlay. Table 7 describes the extent and slope of each valley segment type on the mainstem. For a complete explanation of valley segment characteristics, see Cupp (1989).

The major valley forming process has been dominated by fluvial, rather than glacial, activity. Alluvial deposition has resulted in an estuarine delta (F1 segment) at the mouth of the river. Aggradation and subsequent channel shift in this low gradient segment has resulted in a hook-shaped channel configuration through the delta deposits. Fluvial deposition has also formed the wide, alluviated valley (F3) above the delta, which extends

Table 6. Slope Classes within the Pysht River Watershed

Slope Class	Acres	Percent of Watershed
0 to 5%	3,331	11
5 to 30%	13,981	48
30 to 65%	11,626	40
65 to 90%	344	1
>90%	0	

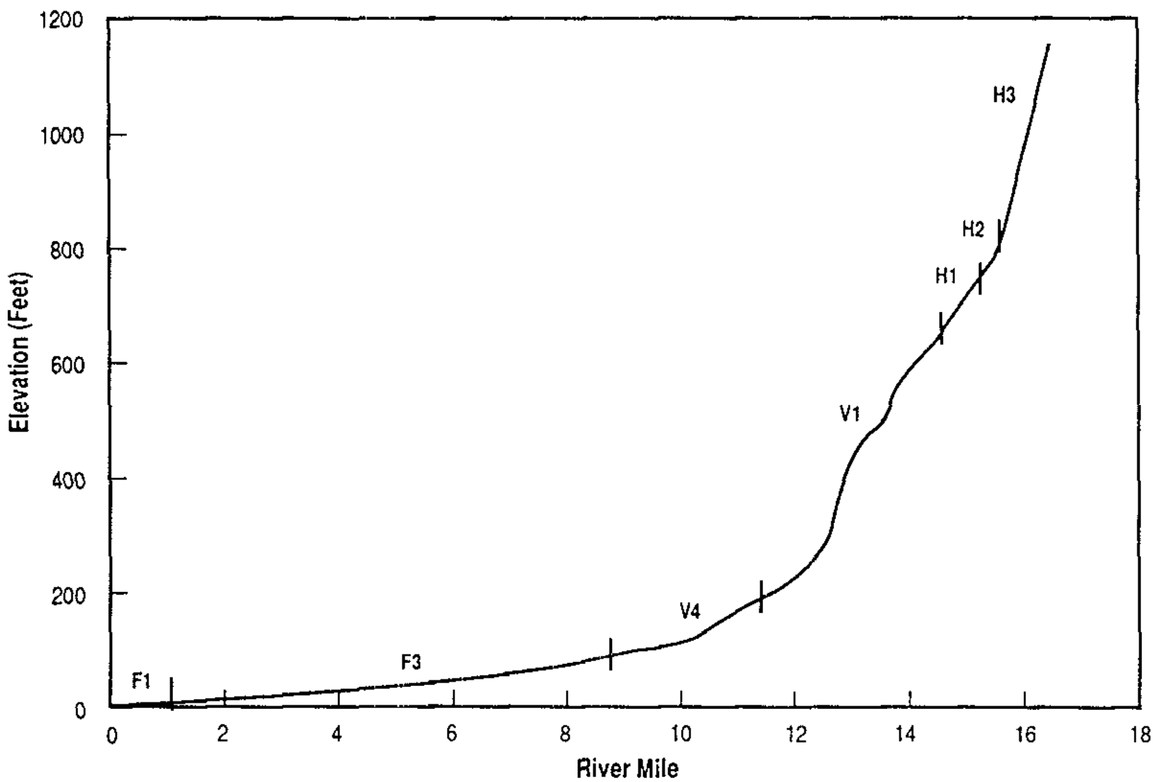

Figure 5. Channel Profile and Valley Segments of the
Pysht River Mainstem

Table 7. Valley Segments of the Pysht River Mainstem

Segment		Extent (river mile)	Valley Bottom Slope
F1 -	Estuarine Delta	0-1.0	<1
F3 -	Wide Mainstem Valley	1.0-8.6	<1
V4 -	Alluviated Mountain Valley	8.6-11.4	1
V1 -	V-Shaped Moderate Gradient	11.4-14.6	3
H1 -	Moderate Gradient Headwater	14.6-15.2	4
H2 -	High Gradient Headwater	15.2-16.0	10
H3 -	Very High Gradient Headwater	16.0-16.4	28

up to river mile (RM) 8.6. The valley bottom width is greater than five times the active channel width in this low gradient, highly meandered segment.

At RM 8.6, just upstream of the confluence with Green Creek, the valley becomes much narrower. It is bounded by moderately steep (30-65%) sideslopes, rather than the gentle slopes adjacent to the lower valley. In the alluviated mountain valley (V4) segment, deposition of sediments eroded from the upper watershed has resulted in a flat valley bottom within the V-shaped valley. Above the V4 segment, the dominant valley-forming process shifts from fluvial deposition to fluvial erosion and sediment transport. The channel in the V1 segment between RM 11.4 and RM 14.6 is tightly confined between steep slopes. The valley gradient increases to 3% and the channel pattern becomes sinuous to straight, rather than meandering, as in the lower valley segments.

Above RM 14.6 the stream becomes a much smaller, second-order channel. Channel gradient gradually increases from 4% in the moderate gradient headwater segment (H1), to 10% in the high gradient headwater segment (H2), and 28% in the very high gradient headwater segment (H3).

Watershed Conditions

Vegetation

Dominant Species and Timber Harvest Intensity. The Vegetation Overlay displays the location of the individual stands, with numbers that correspond to information about each stand in the Vegetation database. A complete listing from the Vegetation database is contained in Appendix D.

As shown in Table 8, 98% of the watershed consists of forested lands, with Douglas-fir *(Pseudotsuga menziesii)*, western hemlock *(Tsuga heterophylla)*, and red alder *(alnus rubra)* being the dominant tree species. Other dominant tree species include Sitka spruce *(Picea sitchensis)*, Pacific silver fir *(Abies amabilis)*, noble fir *(Abies procea)*, and a small grove of giant sequoia *(Sequoiadendron giganteum)*. Non-forested lands within the watershed include approximately 600 acres in rural residential and pastoral uses.

The primary factors affecting timber stand age have been logging and forest fires. Timber harvest began in the early 1900s (Sterhan, pers. comm.) and has continued throughout the watershed into the present. Much of the area south of the mainstem and east of Burnt Mountain was burned during a forest fire in the late 1930s. As a result of these disturbances, 60% of the watershed contains stands originating between 1910 and 1950 (Table 9). Timber removal in the past decade has resulted in 22% of the watershed in a stand age of less than 10 years old, and another 2% containing unstocked units scheduled for replanting in 1990-1991.

The majority of timber stands in the watershed are fairly well stocked, with between 250 and 350 trees per acre (tpa). Stand densities are less than 250 tpa on 3,838 acres; 250 to 350 tpa on 14,012 acres; and greater than 350 tpa on 4,307 acres. Stand density was not

Table 8. Acreage Occupied by the Dominant Tree Species within the Pysht River Watershed

Dominant Species	Acres	Percent of Watershed
Douglas-fir	11,389	39
Western hemlock	7,682	26
Red alder	7,107	24
Sitka spruce	1,731	6
True fir[1]	103	--
Sequoia	2	--
Planned regeneration	605	2
Non-forest	663	2

1 Includes noble fir and Pacific silver fir.
2 Includes rural residential/agricultural lands, gravel pits, lakes, and wetlands.

Table 9. Stand Age of Forested Lands within the Pysht River Watershed

Age as of 1990	Acres	Percent of Watershed
< 1 year	583	2
1-10	6,480	22
11-20	1,316	5
21-30	407	1
31-40	776	3
41-50	12,681	43
51-60	3,244	11
61-70	1,582	5
71-90	362	1
91-200	1,188	4
Non-forest	663	2

available on 7,055 acres (including the residential/agricultural parcels in the watershed). Stands in the 1-249 tpa class have generally been precommercially thinned or include larger diameter, mature timber.

Riparian Condition. Red alder is the dominant riparian vegetation within the lower, wide alluviated valley bottom. Further upstream, as the valley narrows, the riparian vegetation becomes less distinct from the upland vegetation, and western hemlock becomes the dominant riparian tree species. The dominant riparian vegetation from the mouth of the mainstem to RM 16.4 consists of 77% red alder, 20% western hemlock, and 5% Douglas-fir (percentages by length).

Table 10 displays the age distribution of dominant riparian vegetation along the mainstem Pysht River. Generally, the red alder in the lower valley bottom is 43-70 years old. Above RM 9.0 the riparian zone has been affected by more recent timber harvest activities and exhibits a greater mix of age classes. Pockets of western hemlock more than 200 years old occur near the headwaters. The RAC rating for the Pysht River corridor is 62.

Disturbance History

Roads. Roads have been constructed within the basin as part of the state transportation system as well as to accommodate timber harvest activities. The Road Overlay displays the location and class of roads in the basin. As shown in Table 11, there are 145.8 miles of roads in the watershed.

The majority of the roads are arterial, gravel-surfaced roads and temporary spur roads. The highest concentration of roads is in that portion of the watershed above the confluence with Green Creek and in the South Fork Pysht subwatershed. Road density of the entire watershed is 3.2 miles per square mile.

Mass Wasting. Five areas of mass wasting were identified through aerial photo review and analysis of the NWIFC stream survey data (Table 12). This watershed inventory project did not include a comprehensive landslide inventory, however, and these observations should not be interpreted as an inventory of all past and present instabilities in the watershed. Only active or recently active areas of at least 1 acre in size were included in this inventory.

Three of the mass wasting areas identified were of natural origin and consisted of steep slopes undermined by Green Creek and the Pysht River. Two areas were caused by timber harvest activities: a landslide originating within a recently logged unit, and a road fillslope failure. These areas have been delineated on the Miscellaneous Features Overlay. The Miscellaneous Features database (Appendix E) contains information on these events.

Fires, Floods, and Other Disturbances. Railroad logging began in the watershed in the early 1900s. Mainlines were constructed up the mainstem Pysht River, Green Creek and South Fork Pysht River. Spur tracks were laid and then removed after

Table 10. Age of Riparian Vegetation along the Mainstem of the Pysht River Watershed (RM 0 to 16.4)

Age as of 1990	Length of Riparian Vegetation (ft)	Percent of Riparian Areas
1-10	2,900	3
11-20	2,300	2
21-30	2,600	3
31-40	1,000	1
41-50	46,40O	54
51-60	4,250	5
61-70	16,200	19
71-100	5,000	6
> 100	5,750	7

Table 11. Length of Roads in the Pysht River Watershed

Road Class	Miles
State highway	8.8
Main paved or gravel-surfaced	11.6
Arterial gravel-surfaced	77.4
Temporary spurs	48.0
Total length of roads	145.8

Table 12. Mass Wasting Features in the Pysht River Watershed

Cell	Cause	Year of Origin	Status	Acres
1	Timber harvest	Pre-1990	Active	3
2	Road fillslope	Unknown	Healing	2
3	Natural	Unknown	Healing	3
4	Natural	Unknown	Active	1
5	Natural	Unknown	Active	1

extracting valuable fir, cedar, and spruce. Selective logging resulted in a high percentage of western hemlock in the residual stands. (Murray, pers. comm.)

Dredging of the mainstem Pysht River occurred sporadically prior to the mid-1960s to keep the channel open for rafting of logs. The dredging operation consisted of a tugboat and dragline used to stir up sediment for transport and removal by the river's current.

Thousands of acres south of the mainstem and east of Burnt Mountain were burned when east winds fanned the Deep Creek fire in the late 1930s. The Burnt Mountain Fire also affected the southern portion of the watershed sometime between 1900-1920. Since the Pysht River is ungaged, there is no record of flood flows within the watershed. It is suspected that the river experienced a relatively high magnitude flood in November-December of 1990. Chum salmon in the lower river were washed over the banks by a flood that exceeded the channel capacity, then left stranded when the waters receded (McHenry, pers. comm).

Land and Water Use

Dams, Mining, Etc. There are no dams within the watershed. There is no evidence of past mineral mining activities within the watershed. Three gravel pits occupying approximately 33 acres were identified within the watershed.

Miscellaneous Features. Miscellaneous features in the watershed include non-forested brush lands, rock outcrops, wetlands, and tidal flats. Six wetlands encompassing 13 acres were identified from the landowner maps and review of aerial photos.

PART 2. SNOW CREEK WATERSHED

The Snow Creek watershed is located approximately 25 miles east of Port Angeles. The 22.7-square mile watershed lies within Sections 6, 7, and 18 of Township 28 N, Range 1 W; Sections 1-19 and 21-23 of Township 28 N, Range 2 W; Sections 1, and 11-13 of Township 28 N, Range 3 W; Sections 30 and 31 of Township 29 N, Range 1 W; and Sections 25, 26, and 34-36 of Township 29 N, Range 2 W. Snow Creek flows directly into Discovery Bay on the Strait of Juan de Fuca.

Methods

Watershed Characteristics

Climate

Elevation. The watershed boundary was delineated on the Uncas, Center, and Tyler Peak USGS 7 1/2 minute topographic maps. Basin and mean elevation were calculated in the same manner as described in Part 1.

Precipitation. Precipitationinformationwas obtained from USGS Climatedata disks and the WDW Snow Creek Research Station. The Climatedata disks were searched to locate weather stations that are within 20 miles of Snow Creek and within the elevational range of the watershed. Unfortunately, no higher elevation climatic stations exist nearby.

Two stations were used to represent precipitation within the watershed: the WDW Snow Creek Research Station at RM 0.8 and 30 feet in elevation, and the USGS Quilcene Station at 120 feet elevation. Snowfall data was compiled using the USGS Sequim 2 Station at 50 feet elevation instead of the WDW Station, since snowfall was not measured at the WDW Station. A summary of average monthly precipitation and snowfall for each of these stations is included in Appendix A.

Since the elevational range of the watershed was not represented very well by the available stations, the area-weighting method was not used to determine precipitation for the watershed. Rather, the average of the two stations was used to estimate monthly and annual precipitation for the Snow Creek watershed.

The 2-year, 24-hour precipitation event for the watershed was determined by consulting the NOAA Precipitation Frequency Atlas (1970). The average of the isopluvials crossing the basin was taken as the 2-year, 24-hour precipitation for the basin.

Air **Temperature.** Air temperature information was obtained from the USGS Climatedata disks. Because daily temperature values were not available, average monthly values were used. Average monthly maximum and minimum temperatures for Sequim 2 and Quilcene were averaged to determine temperatures for the Snow Creek watershed. A summary of the temperature information for the two stations is included in Appendix A.

Water Temperature. The WDW has been monitoring average daily stream temperatures at RM 0.8 of Snow Creek since 1977. Data from 1977 through 1990 were used to calculate an average daily maximum, minimum, and average monthly stream temperature for Snow Creek.

Geology. The Geologic Map of the Olympic Peninsula (Tabor and Cady 1978 - original scale 1:100,000) was reproduced at a scale of 1:24,000 to construct the Geology Overlay of the watershed. Mapping unit boundaries displayed on the Geology Overlay should be viewed with the original scale of these maps in mind. The Geology Overlay is designed to provide a general characterization of the geologic makeup of the watershed rather than a detailed investigation.

Soils. The Soils Overlay was constructed using the State Soil Survey Township Soil Maps for the Straits district (original scale 1:24,000) and, where the State Survey was incomplete, the Olympic National Forest Soil Resource Inventory (SRI). The database description in Appendix C explains how the SRI was interpreted to mesh with the State Soil Survey information.

Hydrology

Drainage Network and Basin Dimensions. Stream orders were completed for the watershed using the standard method developed by Strahler (1964) and previously explained in Part 1.

Watershed area was measured with a Planix planimeter. Snow Creek is a fourth-order stream; it was divided into two third-order subwatersheds. Basin length was measured from the mouth to the drainage divide following the main channel. Basin width was measured at the midpoint of the channel, perpendicular to the direction of flow. Relief ratio was calculated as the basin relief divided by the length of the basin (Dunne and Leopold, 1978).

Flow. A WDW gage is located at the Snow Creek Research Station at RM 0.8. A USGS gage was previously located at RM 3.9, above the confluence with Andrews Creek, but discontinued in 1973. Streamflow records are available for 1977 - 1990 at the WDW gage and 1952 - 1973 at the USGS gage. Since the USGS gage does not represent the entire watershed included in this inventory, data from the WDW gage were used to calculate average daily, monthly, and annual flows.

A daily hydrograph was constructed by averaging daily flow values for the fourteen year period of record (1977 - 1990). A flow duration curve was calculated by hierarchically ordering the actual daily values (from lowest to highest) to determine the percentage of time each flow value was equalled or exceeded throughout the 14-year period of record.

The average annual flow value was determined as the average of the daily flow measurements for the period of record. The 2-year return period flow was calculated using Weibull's formula (in Linsley et al. 1975), which relates return period to the rank of the event in order of magnitude and the number of years of record.

Existing Studies. The WDW and the Port Gamble Klallam Indian Tribe were contacted to determine whether any instream flow or other pertinent studies have been conducted on Snow Creek. The location of the gaging stations is shown on the Miscellaneous Features Overlay.

Geomorphology

Slope Classes. The watershed was stratified into slope classes as described in Part 1.

Channel Profile. The methodology for constructing the channel profile is explained in Part 1.

Valley Segments. Valley segments were identified using the methodology developed by Cupp (1989) and previously described in Part 1.

Watershed Conditions

Vegetation

Dominant Species and Timber Harvest Intensity. Major landowners within the Snow Creek watershed were contacted to obtain timber stand species composition, age, and stand density. Major landowners include the WDNR, Olympic National Forest, Pope Resources, NDC Timber, and The Travelers Timber Investments.

The WDNR supplied stand maps at 1:24,000 scale from their GIS system timber stand inventory. Dominant and subdominant species and year of origin was available for all stands. Stand density information for many of the stands was in terms of basal area and average dbh, rather than tpa. In these cases tpa was calculated by dividing basal area by the area occupied by the average tree diameter.

The Quilcene Ranger District of the Olympic National Forest also supplied vegetation information on 1:24,000 scale maps produced by a GIS system database. Year of origin was available for all stands on National Forest lands. Dominant species and tpa were available for most stands. Where not supplied by the Forest Service, these parameters were estimated by aerial photo interpretation and some field verification.

Pope Resources supplied stand maps at 1:12,000 scale which displayed stand type, stocking percentage, and year of origin. Typing of individual stands had been done in 1980 and the maps had been updated in late 1989. The stand boundaries, types and year of origin were quite accurate on the maps. However, all of the stands had the same stocking density and, therefore, it was determined that an accurate tpa figure could not be estimated from this data. These stands have a comment that "trees per acre is unavailable" in the Vegetation database.

NDC Timber provided maps at a scale of 2" = i mile which displayed stand boundaries. They gave an estimate of tpa and year of origin for the stands. Dominant species was estimated from nearby, similar stands.

Travelers provided maps at 1:12,000 scale which displayed stand boundaries, dominant and subdominant species, year of origin, and stocking percentage. Since most of the stands were less than 60 years old, 350 tpa was used as 100% stocking, and tpa was then estimated from the stocking percentage.

Stand maps supplied by the landowners were re-drafted onto mylar overlays. Some difficulty was encountered in precisely matching section lines with the maps supplied by the landowners to those on the USGS quadrangles. Accuracy of the stand lines is estimated to be within 40 feet of actual stand boundaries.

Vegetation information for 20% of the watershed was interpreted from aerial photos. This included residential/agricultural land in the valley bottom and small tracts of timber land. Interpretation of 1:12,00 scale, 1990 aerial photos was used to estimate the vegetative conditions. Stand composition, age and density was determined by comparing these stands to adjacent stands for which information had been supplied by the landowner. A comment to this effect is included in the database (Appendix D).

The final overlays consist of a series of numbered cells which are keyed to a Dbase database that contains information on ceil acreage, dominant and subdominant species, year of or/gin, and tpa. The acreage of the stands reported in the database is the gross map acreage. "Ribbon acres" of roads within the stands have not been subtracted from the stand acreage.

Also included in the Vegetation database is locational information, including WRIA, subwatershed, legal description, ownership, and identification number assigned by the landowner. The Comments section identifies stands for which vegetation information was interpreted from aerial photos.

Aerial photos and a February 22, 1991 field investigation were used to verify the data. Particular attention was given to ensuring that recent harvest activities were accurately portrayed.

Riparian Condition. Riparian stand species and ages were determined from the mouth of Snow Creek, upstream to the headwaters. Tree species and age in the upper watershed were obtained from the timber stand inventory supplied by the landowners. In the lower, wide valley bottom, most of the land is in residential or agricultural uses adjacent to the stream. The stand composition and year of origin were determined during the February 22, 1991 field review.

The RAC rating was then calculated by weighting the age of each riparian timber stand by the length of stream corridor occupied. For example, a RAC rating of i00 indicates that the entire length of stream corridor contains 100-year-old trees, while a rating of 1 means that the entire stream corridor contains one-year-old trees.

Disturbance History

Roads. The location of roads in the watershed was determined using 1:12,000 scale 1990 aerial photos and maps supplied by the major landowners. Roads were divided into four classes: state highway; main paved or gravel-surfaced; arterial gravel-surfaced; and temporary spurs. The length of roads in each class was measured and road density was calculated as the length of road divided by the watershed area.

Mass Wasting. Landslides were inventoried using 1957, 1965, 1980, 1985 and 1990 aerial photos. The February 22, 1991 field review also provided the opportunity for further verification of mass wasting activity.

Fires, Floods, and **Other Disturbances.** Local land managers were contacted to obtain information on past disturbances, including fire and floods. The data from the WDW gaging station near the mouth of Snow Creek was also examined for information regarding extreme flood events.

Land and Water Use

Dams, Mining, Etc. Field investigation, aerial photo review, and local contacts were used to check for past or active dams and mining activities affecting the basin. The location of gravel pits was supplied by the landowners.

Miscellaneous Features. The location of lakes, wetlands, powerlines, and other miscellaneous features was included in the timber stand inventories supplied by individual landowners. This information was further verified through examination of 1990 1:12,000 scale aerial photos. These features are mapped on the Vegetation Overlay and included in the Vegetation database (Appendix D).

Results

Watershed Characteristics

Climate

Elevation. Mean elevation of the basin is 960 feet. Elevation ranges from sea level where Snow Creek enters Discovery Bay to 4,273 feet on Mt. Zion.

Precipitation. Monthly precipitation and depth of snowfall is presented in Table 13 and Figure 6. Average annual precipitation for the watershed is 41.4 inches and average annual depth of snowfall is 5.4 inches. The snowfall depth does not reflect actual accumulation of the snowpack on the ground, but rather, the sum of individual snowfall events.

Air Temperature. Average maximum and minimum monthly temperatures are presented in Table 13 and Figure 7. The average annual maximum temperature is 59oF and the average annual minimum temperature is 39’F.

Water Temperature. Average daily stream temperature is displayed in Figure 8. Table 14 displays the monthly average, maximum and minimum stream temperatures.

Table 13. Summary - Snow Creek Watershed Climate

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (inches)	5.3	4.7	4.3	2.8	2.7	2.1	1.1	1.2	1.8	3.1	6.0	6.5	4[.4
Snowfall Depth	2.1	.7	.4	0	0	0	0	0	0	0	.3	1.3	5.4
Maximum Temperature (degrees F)	45	49	53	58	64	69	73	75	69	60	50	45	59
Minimum Temperature	31	32	34	37	42	47	50	50	45	39	34	31	39

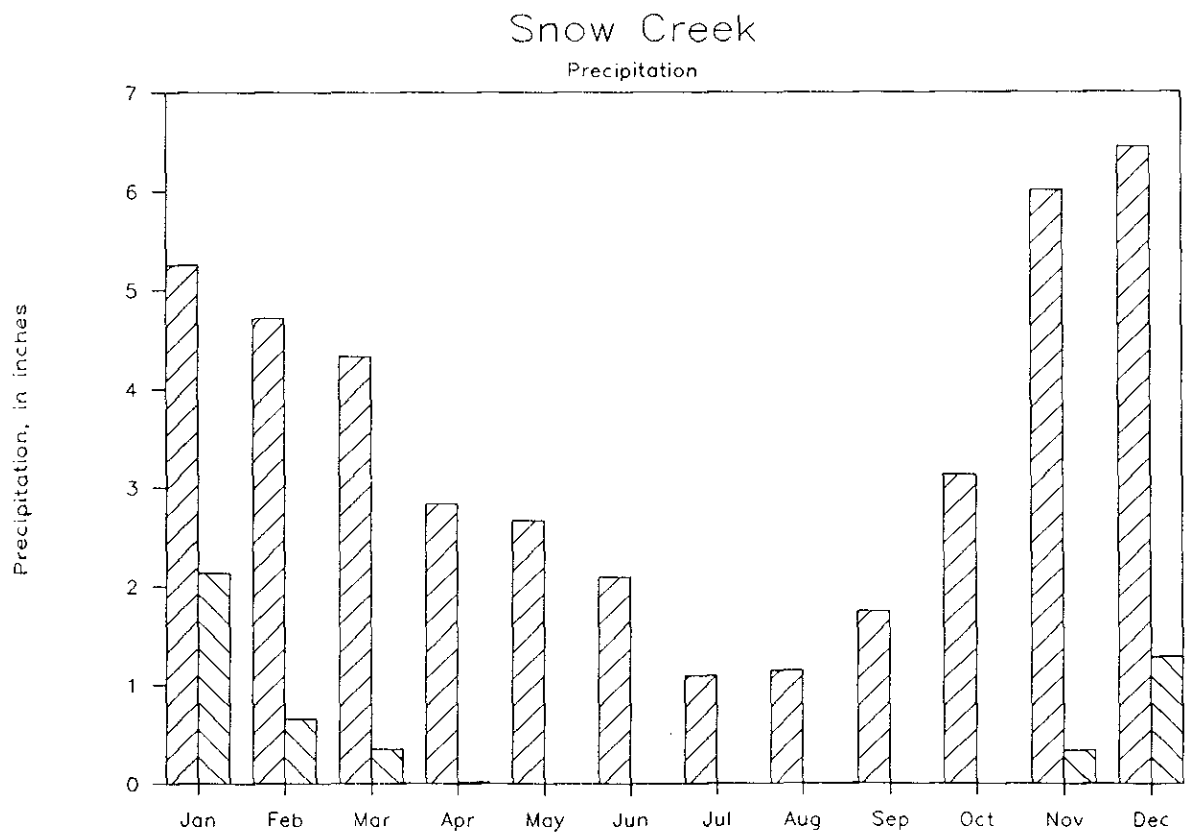

Figure 6. Monthly Precipitation and Snowfall Depth Calculated for the Snow Creek Watershed

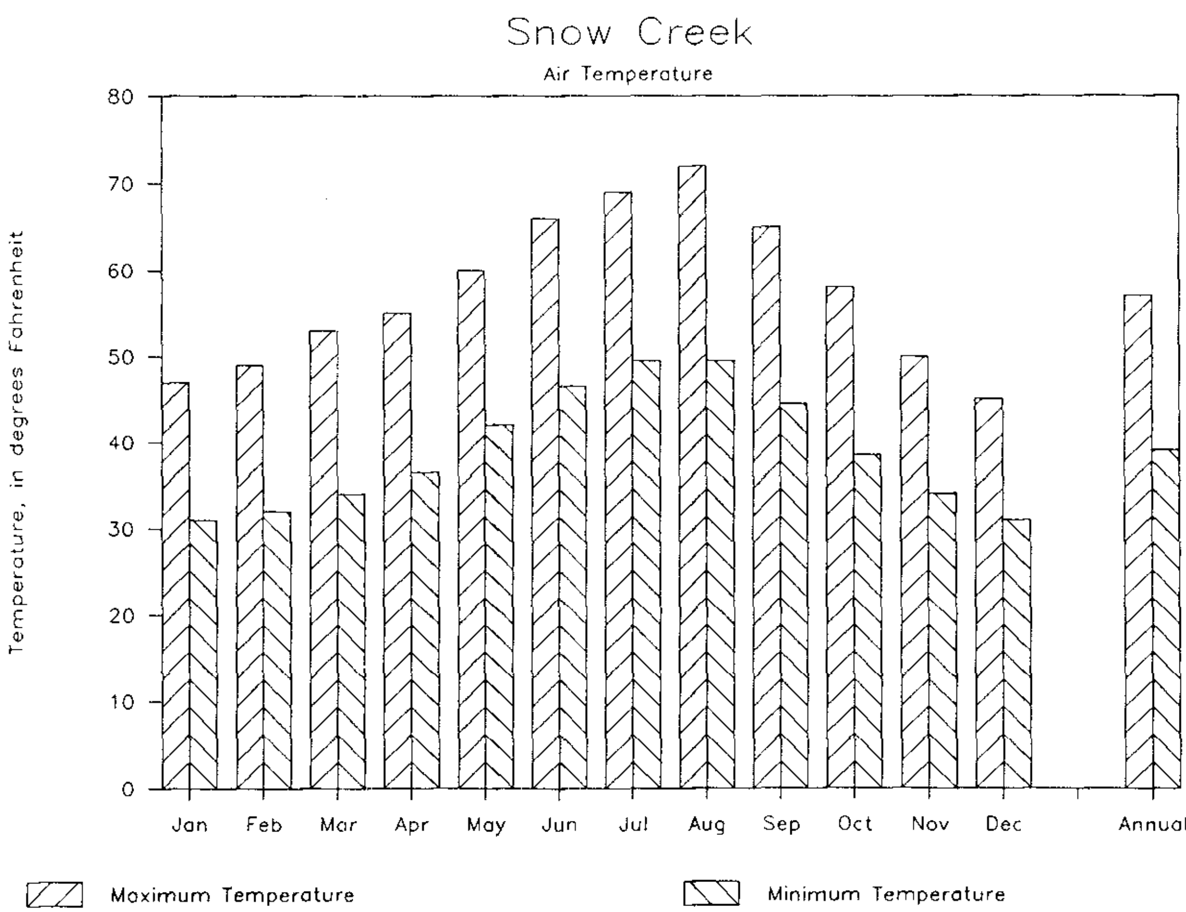

Figure 7. Monthly Maximum and Minimum Air Temperature Calculated for the Snow Creek Watershed

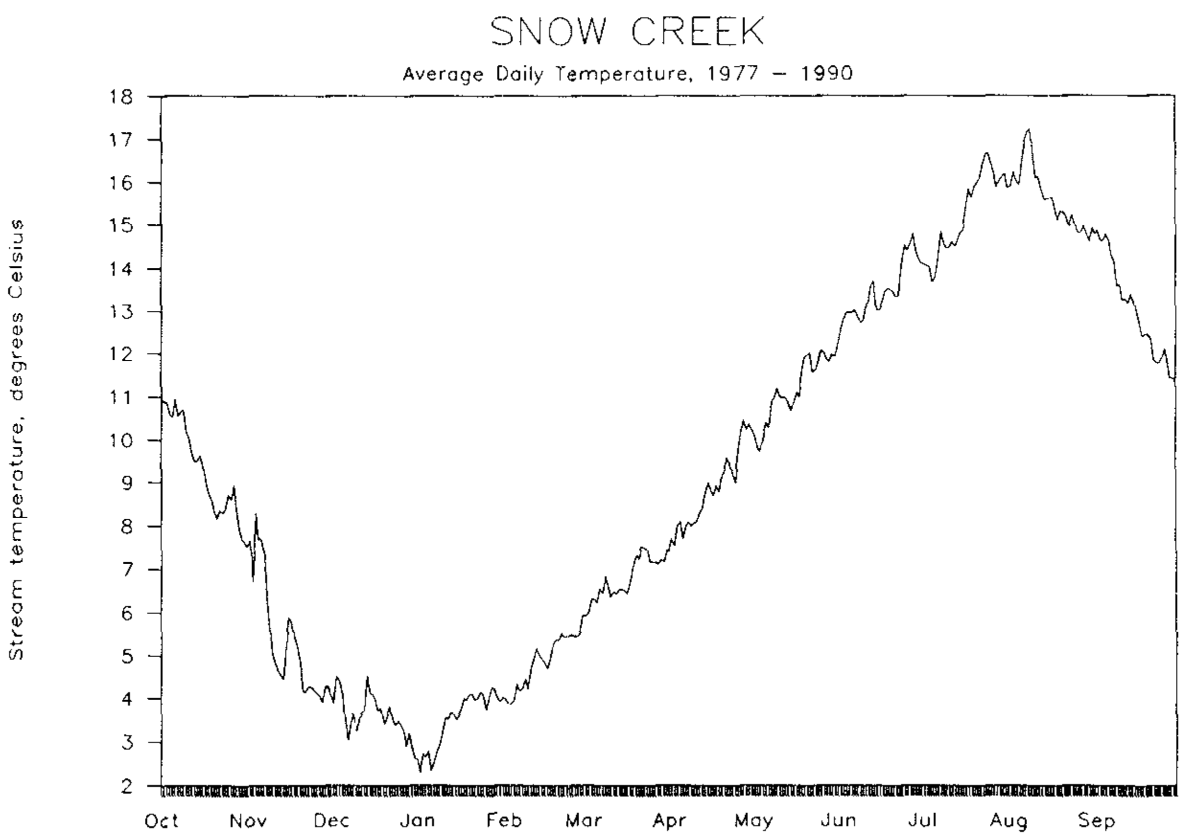

Figure 8. Average Daily Stream Temperature Measured at the WDW Gaging Station, 1977 - 1990

Table 14. Snow Creek - Summary of Monthly Stream Temperatures, in Degrees Celsius Based on Average Daily Stream Temperature Data Collected During 1977 to i990 by the Washington Department of Wildlife Snow Creek Research Station

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum	14.7	11.4	9.2	8.2	8.6	11	12.8	16.4	19.5	20.5	20.5	18.3
Average	9.4	5.4	3.6	3.5	4.8	6.8	8.8	11.1	13.4	15.2	15.7	13.0
Minimum	3.2	-0.7	-3.4	-2.3	-0.1	3	2.5	6.8	15	10.9	11.9	67

Temperatures are generally below 5 o C from early December through the end of February. A warming trend begins in March and continues to early August, when the average daily temperature reaches 17°C. Mid-August to early September brings a gradual decrease in average daily temperatures to the 14 - 16°C range. Temperatures continue to fall from an average daily of 12°C in mid-September to 7°C by mid-November and a low of slightly greater than 2°C in mid-January. Average annual stream temperature is 9°C.

Geology. Table 15 displays the geologic makeup of the watershed. Marine sedimentary rocks underlie 50% of the basin. Laid down while the present day Olympic Peninsula was submerged beneath the ocean, the Lyre and Twin River formations date from the late Eocene to early Miocene ages. These formations consist primarily of marine sandstone, siltstone and conglomerate.

The oldest formation in the watershed is the Crescent formation, which dates to the early to middle Eocene Age. Submarine eruptions resulted in the basalt pillow lava, flow breccia, massive flows, and tuff breccia which underlie the flanks of Tyler Peak in the headwaters of the Snow Creek watershed.

By the middle of the Miocene Epoch, about 15 million years ago, most of the Coast Range region had emerged from the Pacific. Recession of the continental glaciers in more recent times has left glacial outwash and till deposits scattered across 38% of the basin. These unconsolidated deposits of gravel, silts and clay occur on the lower slopes and benches, and in the tributary valley bottoms. Relatively young, alluvial deposits are located in the mainstem valley bottom.

Soils. The Soils Overlay and database display the location and properties of the soils within the watershed. In an undisturbed state, nearly all soils within the watershed are rated as stable (Table 16). After disturbance by the construction of roads or landings, and/or by timber harvesting, the soils on 19% of the watershed are rated as unstable, and a very small percentage is rated as very unstable.

The hazard for accelerated erosion of cut slopes, fill slopes, or sidecast material is rated as slight on 8,505 acres (58%), moderate on 4,549 acres (31%), and severe on 521 acres (4%). Areas unsuitable for road construction amounted to 966 acres (7%). The timber harvest-related erosion potential is rated as low on 9,816 acres (68%), medium on 4,133 acres (28%), and high on 195 acres (1%). Areas unsuitable for timber harvest amounted to 397 acres (3%). These ratings have been developed by the WDNR (1974) for the Straits district. They are explained in more detail in the soils database description, Appendix C.

Site index classes for the Snow Creek watershed are displayed in Table 17. Site index is a designation of the quality of a forest site based on the height of the tallest trees in a stand at the age of 50 years. The site index for the majority of the watershed applies to Douglas-fir stands and ranges from 80 to 139, with an average of 110.

Table 15. Geologic Mapping Units within the Snow Creek Watershed

Unit/Symbol	Description	General Category	Acres	Percent
Qa	Quaternary alluvium	Unconsolidated	963	7
Qc	Quaternary glacial drift	Unconsolidated	5,466	38
Ttr	Twin River formation	Sedimentary rock	2,394	16
Tlc, Tlv	Lyre formation	Sedimentary rock	4,958	34
Tcbb	Crescent formation	Volcanic rock	760	5

Table 16. Soil Stability Characteristics within the Snow Creek Watershed

Condition	Natural Stability		Disturbed Stability	
Stable	14,236 (98)		11,531	(79)
Unstable	230 (2)		2,743	(19)
Very Unstable			192	(1)
Not Rated[1]	75	--	75	--

Includes water and filled land.

Note: Expressed in acres and percent of watershed area. Ratings are from the State Soil Survey Report for the Olympic Peninsula (WA DNR 1974) and interpreted for the Olympic National Forest Soil Resource Inventory.

Table 17. Site Index for the Snow Creek Watershed

Index Species	Site Index	Acres	Percent of Watershed
Douglas-fir	80-99	5,731	40
	100-119	2,761	19
	120-139	5,298	36
Western hemlock	105	173	1
Red alder	80-90	181	1
Not rated[1]		397	3

Includes mucks, peats, filled land, and water.

Hydrology

Drainage Network and Basin Dimensions. Snow Creek is a fourth-order stream with a watershed area of 14,541 acres. General orientation of the upper basin is east, with an abrupt turn to the north near the confluence with Andrews Creek. Two overlays display the watershed boundary and stream orders. The Snow Creek watershed contains 22.7 miles of first-order streams, 7.4 miles of second-order streams, 8.4 miles of third-order streams, and 3.4 miles of fourth-order streams. Drainage density for the 22.7-square-mile watershed is 1.85 miles per square mile.

Basin width is 15,000 feet and basin length is 50,500 feet. The relief ratio is 0.15.

Flow. A summary of stream gaging data for both the WDW gage at RM 0.8 and the USGS gage at RM 3.9, above the confluence with Andrews Creek, is provided in Table 18. Average annual flow for the entire Snow Creek watershed is 22 cfs. This translates to an average annual runoff of 1.0 cfs per square mile. The maximum flow for the period of record is 1,309 cfs, while the minimum is 0.6 cfs. The two-year flood flow was calculated to be 428 cfs.

Figure 9 displays the daily hydrograph for the basin, developed from the WDW gaging data. Flows fluctuate greatly between late November and the end of March, with a trend toward the highest daily flows in January and February. Low flows occur from August through September. The flow duration curve for the basin is shown in Figure 10.

Existing Studies. The WDW Snow Creek Research Station is located at RM 0.8. Streamflow, stream temperature, and precipitation has been monitored by the WDW since 1977. The WDW has been studying the life history of wild fish populations on Snow Creek since 1977, and began monitoring upstream and downstream migrants in 1981 (Johnson, pers. comm.).

Geomorphology

Slope Classes. The Slope Overlay displays the distribution of slope classes in the watershed. The acreage of each cell on the overlay, according to slope class, is provided in Appendix B.

Table 19 displays acreage of land in the slope classes. The majority of the watershed is comprised of gentle slopes of less than 30%. Approximately one-third of the watershed is moderately steep, with slopes of 30 to 65%. A small portion of the basin contains steep slopes of 65 to 90%.

Channel Profile. The channel profile is displayed in Figure 11, while the data used to develop the profile are contained in Appendix D. A typical pattern of increasing slope from mouth to headwaters is exhibited by the channel.

Valley Segments. The distribution of valley segment types is shown on the Valley Segment Overlay. Table 20 and Figure I1 describe the extent and slope of each

Table 18. Summary of Snow Creek Streamflow in CFS

	Oct	Nov	Dec	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Sep	Annual
WDW Gage at RM 0.8													
D Average	6	23	34	51	48	31	24	20	19	9	4	5	22
D Maximum	60	364	638	1,3(7)	464	211	100	130	157	40	20	58	1,309
D Minimum	1.0	1.7	6.4	3.8	3.5	3.2	5.1	2.5	2.4	1.2	0.9	0.6	0.6
USGS Gage at RM 3.9													
D Average	6	12	24	32	27	24	22	19	13	g	4	4	16
D Maximum	154	209	240	500	250	210	95	147	77	85	19	19	500
D Minimum	1.9	2.3	3.(l	3.8	4.3	5.1	5.7	4.0	3.0	1.5	1.1	1.5	1.1

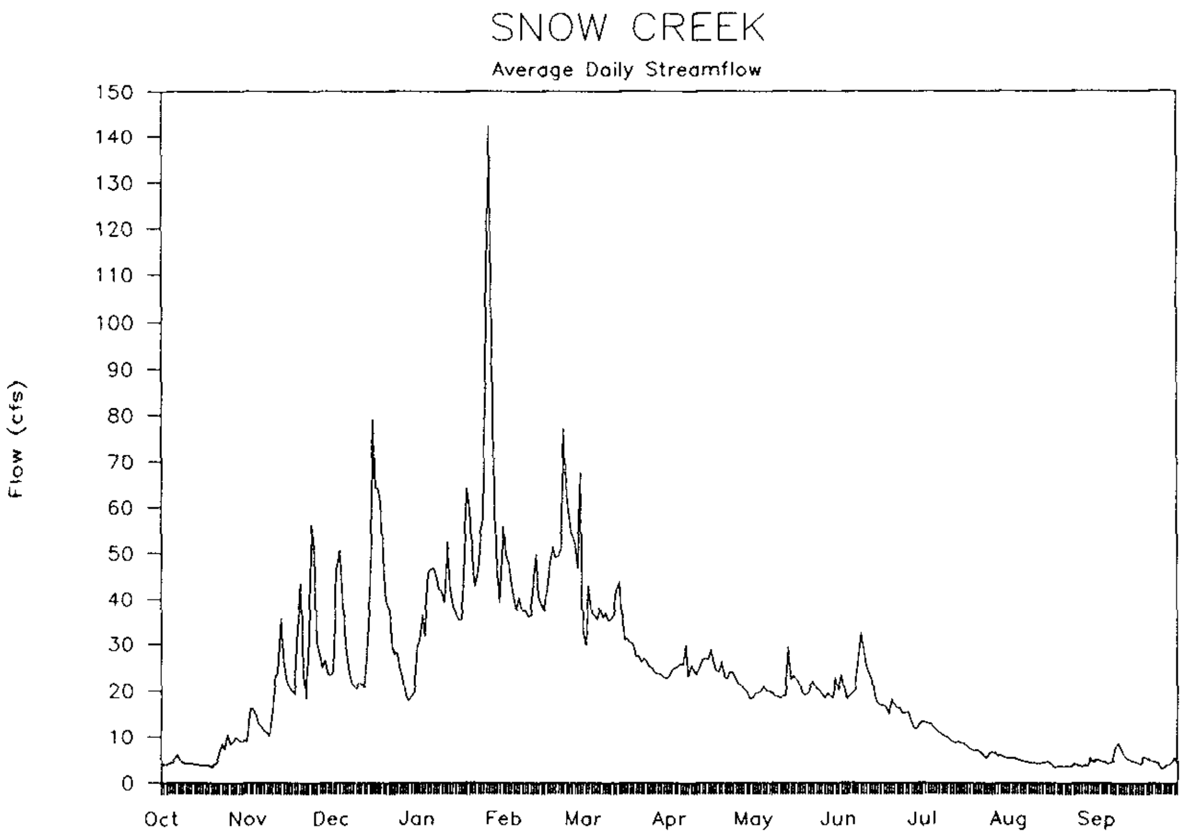

Figure 9. Daily Hydrograph for Snow Creek at the WDW Gaging Station, River Mile 0.8

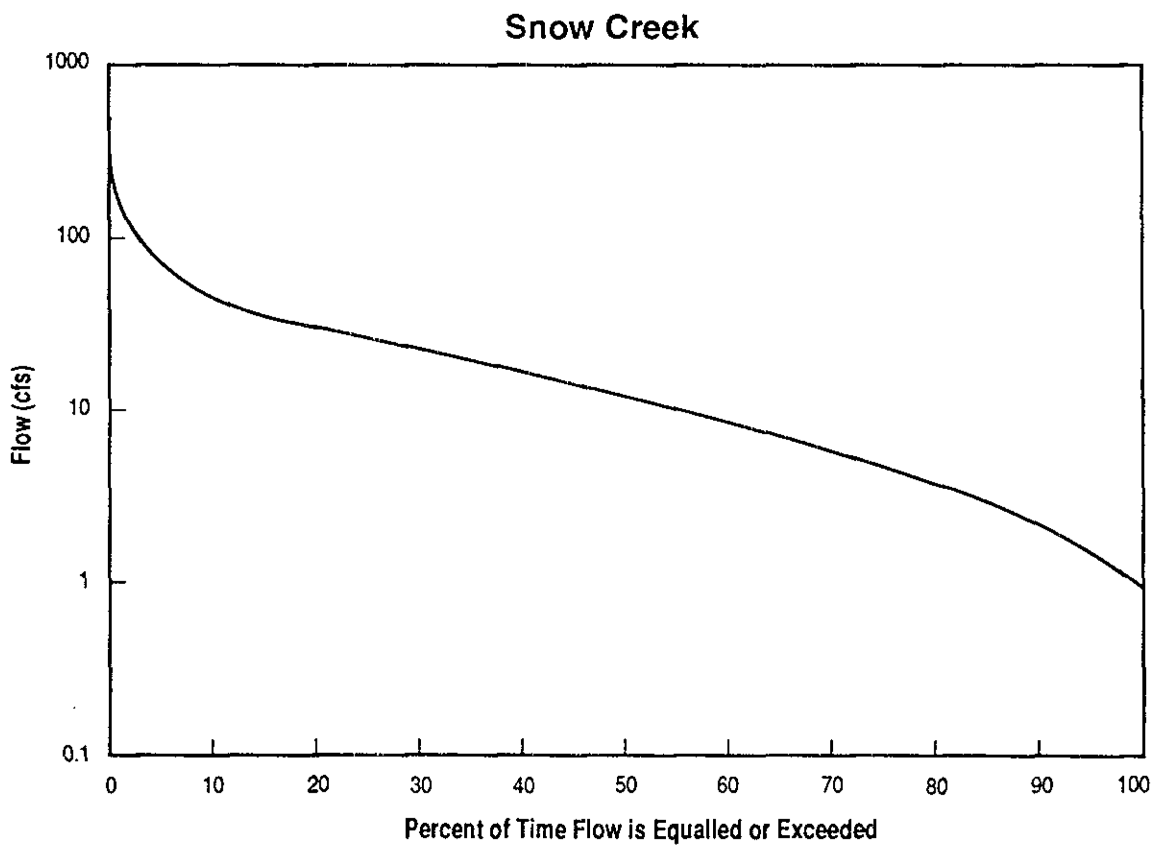

Figure 10. Flow Duration Curve Calculated from 14 years of Gauging Data on Snow Creek

Table 19. Slope Classes within the Snow Creek Watershed

Slope Class	Acres	Percent of Watershed
0 to 5%	1,186	8
5 to 30%	8,561	59
30 to 65%	4,507	31
65 to 90%	287	2
>90%		

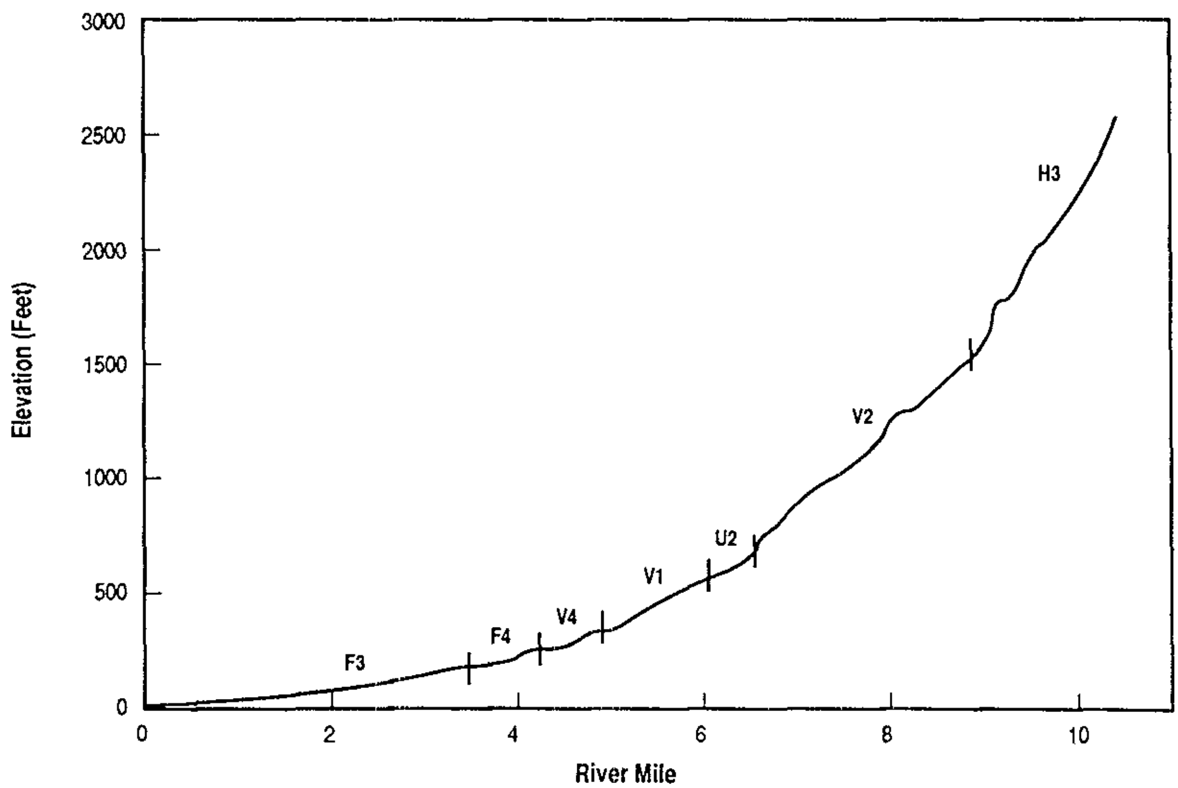

Figure 11. Channel Profile and Valley Segments of Snow Creek

Table 20. Valley Segments of the Snow Creek Mainstem

Segment		Extent (river mile)	Valley Bottom Slope
F3 -	Wide Mainstem Valley	0-3.7	<1
F4 -	Alluvial Fan	3.7-4.1	4
V4 -	Alluviated Mountain Valley	4.1-4.7	2
V1 -	V-Shaped Moderate Gradient	4.7-6.0	4
U2 -	Incised, U-Shaped Moderate Gradient	6.0-6.4	4
V2 -	V-Shaped, Steep Gradient	6.4-8.8	7
H3 -	Very High Gradient Headwater	8.8-10.4	11

valley segment type on the mainstem of Snow Creek. For a complete description of valley segment characteristics, see Cupp (1989).

The valley segments found in the Snow Creek watershed indicate that valley formation has been influenced by both glacial and fluvial processes. The stream meanders through a wide, flat mainstem valley (F3) from the mouth to RM 3.7. The manner in which the stream enters this valley, with an abrupt turn to the north from an eastward-facing valley, is somewhat unusual. Furthermore, an alluvial fan (F4 segment) occurs between RM 3.7 and 4.1, where Snow Creek exits the tightly confined, east-facing valley and turns north upon entering the wide, mainstem valley. Alluvial fans normally occur where higher gradient, tributary streams deposit their bedloads upon entering a lower gradient, mainstem valley. The presence of this alluvial fan segment on Snow Creek, as well as a similar pattern on Andrews Creek to the south, implies that the mainstem valley may not have actually been formed by Snow Creek or Andrew Creeks, but perhaps, by a much different, ancient river, or even a lobe of the continental ice sheet.

Upstream of the alluvial fan segment, the stream has cut a V-shaped valley within an ancient U-shaped valley. The depth of the of incision between RM 4.1 and RM 6.0 is greater than 100 feet and, therefore, the valley segment types are classified as V-shaped, rather than incised U-shaped. In the alluviated mountain valley segment (V4) between RM 4.1 and RM 4.7, deposition of sediment has created a flat valley bottom, approximately twice the width of the active channel, within the V-shaped valley. Between RM 4.7 and 6.0, the channel gradient increases and the stream is tightly confined between the steep sideslopes, resulting in a V1 segment.

Upstream of the V1 segment, the depth of incision through the U-shaped valley is less and the stream-adjacent sideslope gradient also declines, resulting in a shallow, V-shaped valley within the larger U-shaped valley (U2 segment).

The stream gradient increases to 7% upstream of RM 6.4 and the channel is confined between steep sideslopes in the V2 segment which extends to RM 8.8. Above RM 8.8 the channel becomes much smaller and gradient increases to 11% through the very high gradient headwater segment (H3).

Watershed Conditions

Vegetation

Dominant Species and Timber Harvest Intensity. The Vegetation Overlay displays the location of individual stands with numbers that correspond to information about each stand in the Vegetation database. A complete listing from the Vegetation database is included in Appendix D.

As shown in Table 21, 92% of the watershed consists of forested lands. Douglas-fir and western hemlock are the dominant tree species in the middle to higher elevations, and red alder dominates the lower elevations and wetter hillslopes. Other common tree species

Table 21. Acreage Occupied by the Dominant Tree Species within the Snow Creek Watershed

Dominant Species	Acres	Percent of Watershed
Douglas-fir	8,356	57
Western hemlock	2,854	20
Red alder	1,906	13
Western red cedar	91	<1
True fir[1]	20	<1
Planned regeneration	132	1
Non-forest	1,182	8

[1] Includes noble fir and Pacific silver fir.

[2] Includes highway and powerline right-of-ways, gravel pits, lakes, wetlands, brush, rock outcrops, and residential/agricultural areas.

include sitka spruce, red cedar, and true firs. The lower valley bottom includes 677 acres in rural residential and agricultural uses.

Table 22 displays the acreage of forested lands according to stand age. Timber harvest likely began during the 1940s. The large percentage of forests originating in 1920 - 1939 (51 - 70 years old) is probably due to the occurrence of forest fires. Stands less than 50 years of age comprise 5,822 acres, equal to 40% of the watershed area. The most intensive periods of timber removal were in the 1940s and between 1975 and 1985. Recent timber harvest has resulted in 247 acres scheduled for planting in 1990 - 1991.

Unharvested, mature timber persists on approximately 6% of the watershed, primarily within national forest lands. There are 949 acres with trees dating to 1880 and 1894, and 20 acres containing trees originating in 1750.

Most of the stands in the watershed are well stocked. Stand densities are less than 250 on 5,061 acres, between 250 to 349 on 3,409 acres, and greater than 350 tpa on 1,840 acres. Stand density was not available on 3,049 acres of forested lands. The majority of the stands with densities of less than 250 tpa are larger, mature timber, or younger stands that have been thinned.

Riparian Condition. The lower 3.8 miles of Snow Creek (within the wide, alluviated valley and alluvial fan segments) flows through a sparsely populated, agricultural valley. A narrow buffer consisting of red alder, maple, and cottonwood trees has been left along most of the stream. In the upper, forested valley, red alder, western hemlock, and Douglas-fir border the channel.

As shown in Table 23, 87% of the length of riparian area contains trees greater than 60 years old and has likely not been harvested. The only recent harvest activity has occurred in the headwaters, where a 1989-origin clearcut borders the stream for 500 feet. The RAC rating is 72 for the entire mainstem corridor.

Disturbance History

Roads. Roads have been constructed within the basin as part of the state transportation system as well as to accommodate timber harvest activities. The Road Overlay displays the location and class of roads in the basin. As shown in Table 24, there are 85.4 miles of roads in the watershed.

The majority of the roads are arterial, gravel-surfaced roads and temporary spur roads. The highest concentration of roads is in that portion of the watershed above the confluence with Andrews Creek. Road density of the entire watershed is 3.8 miles per square mile.

Mass Wasting. Twelve areas of mass wasting were identified from field and aerial photo review. This watershed inventory project did not include a comprehensive landslide inventory, however, and these observations should not be interpreted as an inventory of all past and present instabilities in the watershed.

Table 22. Stand Age of Forested Lands within the Snow Creek Watershed

Age as of 1990	Acres	Percent of Watershed
< 1 year	247	2
1-10	2,588	18
11-20	292	2
21-30	242	2
31-40	566	4
41-50	1,887	13
51-60	3,705	25
61-70	2,272	16
71-90	611	4
91-200	929	6
>200	20	<1
Non-forest	1,182	8

Table 23. Age of Riparian Vegetation along the Mainstem of the Snow Creek Watershed (RM 0 to 10.1)

Age as of 1990	Length of Riparian Vegetation (ft)	Percent of Riparian Areas
1-10	50O	**1**
11-30		
31-40	1,750	3
41-50	4,250	8
51-60		
61-70	42,000	78
71-100		~m
> 100	5,000	9

Table 24. Length of Roads in the Snow Creek Watershed

Road Class	Miles
State highway	8.5
Main paved or gravel-surfaced	10.0
Arterial gravel-surfaced	44.9
Temporary spurs	22.0
Total length of roads	85.4

Characteristics of the areas identified are displayed in Table 25. Features #1-7 occur on the slopes adjacent to Snow, Andrews, and Trapper Creeks. Downcutting of these streams has created over-steepened slopes prone to failure. The failures are likely natural in origin, but could have been exacerbated by timber harvest activities in the area. These areas are currently vegetated with young trees and shrubs.

More small, recent failures have occurred in relation to roads constructed for timber harvest. Features #10-14 have failed in the past decade and are currently unvegetated.

Fires, Floods, and Other Disturbances. The largest flood measured at the WDW gage occurred during January 26 - 28, 1983. Average daily flow on January 27 reached 1,309 cfs, the maximum for the 14-year period of record. Other high flows occurring during the period of record include the December 16, 1982 flow of 638 cfs, and the January 19, 1986 flow of 449 cfs. The vegetation data reveal that 73% of the unharvested timber stands in the watershed originate between the years 1920 and 1930. It is likely, therefore, that forest fires burned a large portion of the watershed sometime in the late 1910s and early 1920s.

Land and Water Use

Dams, Mining, Etc. There are no dams within the watershed. There is no evidence of past mineral mining activities within the watershed. Three gravel pits occupy approximately 14 acres in the watershed.

Miscellaneous Features. Miscellaneous features in the watershed include a state highway and powerline right-of-way, brush and rock outcrops, two lakes, and several wetlands. The locations of these features are shown on the Vegetation Overlay. Rural residential areas and small agricultural enterprises occupy 677 acres within the lower Snow Creek valley.

PART 3. COMPARATIVE SUMMARY AND CONCLUSIONS

Comparison of Watershed Characteristics

The Pysht River and Snow Creek watersheds lie within the Coast Range ecoregion (Omernik and Gallant, 1986) and Northern Coastal Zone of the Olympic Peninsula (Amerman and Orsborn, 1987). A summary of the natural characteristics of the two study areas is provided in Table 26.

Snow Creek watershed is approximately half the size of the Pysht River watershed. Snow Creek is a fourth-order stream while the Pysht River is a much larger, fifth-order stream. While both streams drop to the Strait of Juan de Fuca at sea level, Snow Creek watershed rises to a higher elevation than the Pysht River watershed and, therefore, has a greater basin relief and mean elevation.

Table 25. Mass Wasting Features in the Snow Creek Watershed

Cell	Cause	Year of Origin	Status	Acres
1	Natural[1]	Pre-1957	Healing	20
2	Natural[1]	Pre-1957	Healing	2
3	Natural[1]	Pre-1957	Healing	10
4	Natural[1]	Pre-1957	Healing	8
5	Natural[1]	Pre-1957	Healing	4
6	Natural[1]	Pre- 1957	Healing	10
7	Natural[1]	Pre-1957	Healing	2
10	Road fillslope	Post-1980	Active	1
11	Road fillslope	Post-1980	Active	1
12	Landing failure	Post-1980	Active	1
13	Road cutslope	1990-1991	Active	1
14	Road fillslope	1990-1991	Active	0.5

[1] Failure occurred prior to timber harvest. Subsequent timber harvest may have added to the instability.

Table 26. Comparison of Watershed Characteristics in Pysht River and Snow Creek Watersheds

	Pysht River	Snow Creek
1. Climate		
Mean Elevation	580 feet	960 feet
Basin Relief	2,650 feet	4,273 feet
Average Annual Precipitation	80 inches	41 inches
Average Annual Maximum Temperature	58oF	59oF
Average Annual Minimum Temperature	40oF	39oF
2. Geology		
Unconsolidated Deposits	14%	45%
Sedimentary Rock	83%	5O%
Volcanic Rock	3%	5%
3. Soils		
Natural Stability	38% stable 61% unstable	98% stable 2% unstable
Disturbed Stability	5% stable 94% unstable	79% stable 20% unstable
Average Site Index	wh = 104	df = t10
4. Hydrology		
Basin Size	29,282 acres	14,541 acres
Mainstem Stream Order	5	**4**
Drainage Density	1.7 mi/mi2	1.8 mi/mi2
Relief Ratio	0.05	0.08
Average Annual Flow	220 cfs	22 cfs
Average Annual Runoff	4.8 cfs/mi2	1.0 cfs/mi2
Two-year Flood Flow	2,024 cfs	428 cfs
5. Geomorphology		
Slope Classes:		
<30%	59%	67%
30% to 65%	40%	31%
> 65%	1%	2%
Primary Valley Segments	F1 - 1.0 mile F3 - 7.6 miles V4 - 2.8 miles V1 - 3.2 miles	F3 - 3.7 miles F4 - 0.4 mile V4 - 0.3 mile V1 - 1.3 miles U2 - 0.4 mile V2 - 2.4 miles

Air temperatures are similar between the two study areas. However, the rain shadow effect of the Olympic Mountains results in the Snow Creek basin, which lies 50 miles east of the Pysht River, receiving approximately half as much precipitation on an annual basis. Due to the lower precipitation input, Snow Creek has a much lower runoff per square mile of watershed. The Pysht River, with twice the annual precipitation as well as a larger watershed area, has an average annual flow ten times greater than Snow Creek.

Despite the greater basin relief, two-thirds of the Snow Creek watershed is flat to gently sloping (<30%), while just over half of the Pysht basin is in this slope class. This is due to the differing geologic histories of the watersheds. The Pysht River watershed is underlain primarily by sedimentary rock, while the Snow Creek watershed contains a mosaic of unconsolidated, glacial till deposits and sedimentary formations. Snow Creek watershed was greatly influenced by the continental ice sheet, as evidenced by the high proportion of the watershed containing glacial till deposits. The retreat of the glaciers left a broad, flat lower valley and gently sloping, U-shaped, upper valley in the Snow Creek watershed. The Pysht River watershed contains a greater proportion of moderately steep slopes, despite a low basin relief, because fluvial action has resulted in many V-shaped valleys in this watershed. Both watersheds have a relatively low relief as compared to watersheds in more mountainous terrain and, therefore, a low percentage of steep slopes greater than 65%.

Soil stability ratings indicate that the Snow Creek watershed is remarkably stable in the undisturbed state. Even when disturbed, 79% of the soils are rated as stable (see Appendix B for a definition of the natural and disturbed soil stability ratings). This is likely due to the high proportion of gentle slopes as well as the low amount of precipitation available to initiate mass wasting and surface erosion. Conversely, soil stability ratings in the Pysht River watershed are remarkably unstable, considering that over half of the basin has a slope of less than 30%. The unstable ratings are likely due to high precipitation, poor drainage conditions, and the behavior of the underlying sedimentary formations.

The different geologic histories and sizes of the two watersheds is reflected somewhat in the primary valley segment types. The larger Pysht River has formed an estuarine delta (F1) at its mouth, while Snow Creek has not. Both streams flow through a wide, alluviated valley (F3) in the lower reaches, although it is suspected that the lower Snow Creek valley was not actually formed by the present-day Snow Creek. Smaller Snow Creek flows through a depositional, alluvial fan segment (F4) as it enters the wide, alluviated valley.

Upstream of the F3 segment, the Pysht River is bounded by a V-shaped valley. Erosion of the relatively unstable sedimentary formations in the upper watershed has resulted in deposition of sediment and formation of an alluvial flat w/thin the lower 2.8 miles of the V-shaped valley (V4). Above the V4 segment is a zone of net erosion and sediment transport, and the moderate gradient channel is tightly confined between the valley walls (V1).

Snow Creek is deeply incised into a broad, gently sloping U-shaped valley above the lower wide, alluviated valley. However, the depth of incision is so great that for much of its length, the valley has characteristics of V-shaped rather than U-shaped valley segment types. As with the Pysht River, there is a zone of deposition in the alluviated mountain valley segment (V4), above which is a zone of net erosion and sediment transport. The progression of increasing gradient from the moderate gradient, V-shaped valley (V1), to slightly higher gradient incised U-shaped valley (U2), to steep gradient, V-shaped valley (V2) reflects the upstream rise of the channel from the level of the lower valley to the level of the upper U-shaped valley, and then up into the mountainous headwaters.

Overall, the Snow Creek watershed has a higher inherent stability than the Pysht River watershed. This conclusion is based primarily on the moderate amount of precipitation, greater percentage of the watershed containing gentle to flat slopes, and high proportion of soils rated as stable under disturbance. Although a greater number of natural mass wasting areas were observed in Snow Creek, these are mostly within the over-steepened valley created by downcutting of the stream, and reflect unstable conditions on a very small proportion of the watershed.

Comparison of Watershed Conditions

Both the Pysht River and Snow Creek watersheds consist primarily of forested lands dominated by Douglas-fir, western hemlock and red alder. Due to the wetter climate, there is a greater proportion of red alder and sitka spruce in the Pysht River watershed. As indicated by the site index, overall both watersheds have fairly good quality land for tree growth.

The primary land use in the watersheds is timber production, although both study areas have rural residential and pastoral uses in the lower valley bottoms. A summary of the management-affected conditions of the two watersheds is provided in Table 27.

Stands younger than 50 years old comprise 76% of the Pysht River basin and 40% of the Snow Creek watershed. The majority of young stands originate in the 1940s and 1980s in the Pysht River watershed, and between 1920 - 1940 and 1975 - 1985 in Snow Creek. Both study areas contain trees ranging in age from 0 to over 100 years old.

Due to the fire history and agricultural practices in both watersheds, it is difficult to determine the percentage of the riparian area that has been clearcut. However, the age of riparian vegetation can be compared through the RAC rating. The Pysht River riparian vegetation is somewhat younger, with a RAC rating of 62, as compared to the RAC rating of 72 for Snow Creek.

Road density is 3.2 miles per square mile in the Pysht River watershed and 3.8 miles per square mile in Snow Creek. While the road densities are fairly similar, it should be kept in mind that the Pysht River watershed is more than twice as large as the Snow Creek watershed.

Most of the mass wasting areas in both watersheds originate on over-steepened slopes adjacent to stream channels. In the Pysht River watershed, three areas where steep sidelopes had been undercut by the stream channel were observed. Areas of instability observed in the Snow Creek watershed are located where Snow Creek and other tributary streams have incised into the upper U-shaped valley. Downcutting by the stream has resulted in over-steepened and unstable sideslopes, particularly on the north side of the channel. A low frequency of currently active mass failures related to timber harvest and roads was observed in both watersheds.

Analysis of the management-affected conditions of the two watersheds leads to the conclusion that the Pysht River watershed has been more highly impacted by timber harvest activities in the past 50 years than the Snow Creek watershed. The Pysht River watershed has also been more intensively harvested in the past decade. However, the size difference between the two study areas makes comparison difficult. A future comparison of the South Fork Pysht River watershed to the Snow Creek watershed may be more appropriate and lead to a better understanding of the influence of inherent watershed characteristics on the impact of management activities.

Table 27. Comparison of Watershed Conditions in Pysht River and Snow Creek Watersheds

	Pysht River	Snow Creek
Vegetation		
Dominant Species:	Douglas-fir Western Hemlock	Douglas-fir Western Hemlock
Age Distribution (Percent of Watershed)		
0 to 10 years	24%	20%
11 to 20 years	5%	2%
21 to 30 years	1%	2%
31 to 40 years	3%	4%
41 to 50 years	43%	13%
51 to 60 years	17%	45%
90 + years	4%	6%
Percent of Watershed Less Than 50 years of Age:	76%	40%
Riparian Area Condition Rating	64%	72%
Road Density	3.2 mi/mi^2	3.8 mi/mi2
Mass Wasting (Number of Areas Observed)		12

Citations

Citations

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Appendix A. Climate and Hydrology

Appendix A. Climate and Hydrology

Climatic information for the two study watersheds was obtained by area-weighting the climatic data for nearby weather stations. The area-weighting was accomplished by drawing lines on the topographic maps halfway between the contours represented by the elevation of each climatic station. Each station was assumed to represent the watershed area within these lines. A weighting factor was then assigned based on the percent of the watershed area represented by each station.

The equation for the climatic data in the Pysht River watershed is: .12 X Clallam Bay + .37 X Elwha Rs + .51 X Sappho. The equation for Snow Creek watershed is: .50 X Quilcene + .50 X Sequim 2/Snow Creek WDW.

Tables A-1 to A-6 display the summary of precipitation for the climatic stations. Snowfall depth is summarized in Tables A-7 to A-11, maximum air temperature in Tables A-12 to A-16, and minimum air temperature in Tables A-17 to A-21.

Table A-1

Station CLALLAM BAY 1 NNE

Id 1465
Elevation 30.0 ft
Begin Date 6/1949

Latitude 48:16:00
Longitude 124:15:00
End Dale 6/1978

Parameter Rain
Coverage96%
Record Cnt 29

Summary of Precipitation, In Inches

	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Seb	Oct	Nov	Dec	Annua~
D Cnt	868	785	860	829	854	841	863	868	840	867	840	856	10171
DAvg	0.46	0.34	0.26	0,17	0.08	0.06	0.05	0.05	0.10	0.25	0.41	0.45	0.22
M Cnt	28	28	28	27	27	28	28	28	28	28	28	27	25
MaxM	31.80	18,81	14.06	9.04	5.68	5.41	5.11	4.62	6.67	17.52	23.83	22.14	105.66
Maxyr	1953	1961	1971	1970	1960	1956	1974	1962	1969	1967	1975	1952	1984
MIn M	1.55	2.53	1.85	0.34	0.21	O.00	O.00	0.09	0.04	1,39	3.45	9.21	54.49
MInyr	1949	1964	1965	1956	1972	1967	1951	1967	1975	1972	1957	1975	1965
Avg M	14,32	9.82	8.03	4.93	2.50	1.74	1.47	1.65	2.99	7.72	12.25	13.68	80.39
M Std	6,85	4.41	3,39	2.53	1.36	1.38	1.32	1.23	1.82	4.00	5.14	3.14	13.22
M Skw	0,59	0.45	0.03	0,04	0.60	1.28	1.17	0.96	0,35	0.76	0.36	1.16	0.21
M Kur	3,40	2.13	1.75	1,83	2.62	3.95	3.24	2.82	2,03	3,00	2.65	3.70	2.12

Table A-2

Station ELWHA R S

Id	2548	Latitude 48:02:00		Parameter	Rain
Elevation	360.0 ft	Longitude 123:35:00		Coverage 95%	
Begin Date 6/1948		End Date 12/1986		Record Cnl 39	

Summary of Precipitation, in inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	1100	1039	1147	1120	1132	1106	1176	1146	1167	1176	1146	1133	13588
D Avg	0.28	0.26	0.19	0.11	0.05	0.04	0.02	0.04	0.07	0.17	0.31	0.33	0.15
M Cnt	36	37	37	38	37	37	38	37	39	38	38	37	29
Max M	22.45	17.52	14.45	7.39	8.89	2.53	3.04	5.81	5.08	12.91	19.00	20.01	78.14
Maxyr	1983	1954	1971	1982	1984	1964	1963	1975	1972	1967	1983	1979	1954
MInM	0.70	2.37	0.86	0.09	0.22	0.22	O.00	0.00	0.02	0.89	0.80	1.96	32.79
Mlnyr	1985	1959	1965	1958	1956	1970	1958	1986	1975	1980	1976	1985	1985
AvgM	8.62	7.36	5.83	3.15	1.68	1.11	0.72	1.13	2.03	5.31	9.02	10.00	54.94
M Std	5.14	3.59	3.17	1.77	0.89	0.61	0.66	1.15	1.27	3.28	4.25	3.70	9.86
M Skw	0.63	0.73	1.01	0.49	0.73	0.55	1.58	2.15	0.36	0.75	0.23	0.08	-0.26
M Kur	2.76	2.99	3.43	2.53	2.90	2.27	5.25	8.11	2.26	2.74	2.41	2.93	3.16

Table A-3

Station SAPPHO 8 E

Id 7319
Elevation 760.0 ft
Begin Date 6/1948

Latitude 48:04:00
Longitude 124:07:00
End Date 12J1986

Parameter Rain
Coverage 89%
Record Cnt 39

Summary of Precipitation, in Inches

	Jan	Fob	Mar	Apr	May	Jun	Jul	Aug	Sop	Oct	Nov	Dec	Annual
D Cnt	960	982	1073	1084	1045	1059	1112	1115	1105	1085	1053	1001	12674
D Avg	0.46	0.46	0.32	0.23	0.13	0.08	0.07	0.07	0.15	0,31	0.48	0.50	0.26
M Cnt	31	35	34	37	33	35	36	36	37	34	35	32	21
Max M	32.20	21.12	16.94	13.34	9.91	6.20	7.05	8.55	12.91	22.78	27.72	30.17	119.32
Maxyr	1953	1961	1971	1970	1984	1956	1983	1978	1969	1984	1983	1979	1954
MInM	0.88	3.75	2.02	1.60	1.08	0.22	0.00	0,03	0.19	0.87	4.36	4.58	79.38
Mlnyr	1985	1962	1965	1956	1956	1951	1960	1988	1975	1972	1952	1986	1976
AvgM	13.88	12.22	9.84	8.70	3,88	2.46	2.04	2.25	4.45	9.48	14,00	15.56	98.59
M Std	7.09	4.84	3.78	2.92	2.02	1.39	1.74	t.77	2.80	5.58	6.51	5.14	11.24
M Sk'w	0.26	0.19	-0.13	0.29	1.24	0.59	1.19	1.27	1.06	6.73	0.33	0.46	0.16
M Kur	2.71	2.10	2.02	2.17	4.04	2.81	3.59	5.09	3.69	2.85	2.18	3.65	1.87

Table A-4

Station SEQUIM 2 E

Id	7544	Latitude 48:05:00		Parameter	Rain
Elevation	50.0 ft	Longitude 123:03:00		Coverage 89%	
Begin Date 10/1980		End Date 12/1986		Record Cnt 7	

Summary of Precipitation, in Inches

	Jan	Feb	Mar	A.or	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	186	169	186	180	188	180	185	186	t80	217	210	216	*2282*
D Avg	0.07	0.06	0.04	0.03	0.04	0.04	0.02	0.01	0.04	0.04	0.09	0.06	0.05
M Cnt	6	6	6	8	6	6	6	6	6	7	7	7	6
Max M	3.75	2.32	1.83	1.42	2.32	2.31	1.13	0.66	3.12	4,36	4.26	3.29	20.24
Maxyr	1983	1986	1982	198t	1983	1984	1982	1985	1983	1985	1986	1981	1983
Min M	0.11	1.10	0.47	0,40	0,42	0.63	0.20	0.01	0.48	0.16	1.24	0.16	12.83
Mlnyr	1985	1983	1986	1984	1982	1982	1984	1986	1986	1980	1982	1985	1985
Avg M	2.03	1.81	1.12	0.89	1.34	1,20	0.53	0.38	1.33	1.37	2.75	1.88	18.38
M Std	1.47	0.51	0.49	0.39	0.71	0,60	0.36	0.27	0.97	1.39	1,10	1.23	2.45
M Skw	-0.20	0.55	-0.34	-0.07	0.05	1.57	0.96	-0.70	1,54	2.12	0.21	-0.35	0. l9
M Kur	1.09	1.09	1.02	1.19	1.16	2.18	1.56	1.08	2.09	3.18	1.31	1.30	1.77

Table A-5

Station QUILCENE 2 SW

Id 6845	Latitude 47:49:00	Parameter	Rain
Elevation 120.0 fir	Longitude 122:88:00	Coverage 97%	
Begin Date 6/1948	End Date 12/1988	Record Cnt 39	

Summary of Precipitation, In Inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sop	Oct	Nov	Dec	Annual
D Cnt	1176	1067	1146	1075	1174	1134	1208	1201	1169	1193	1155	1195	13893
D Avg	0.25	0.25	0.20	0.12	0.09	0.07	0.04	0.04	0.06	0.15	0.29	0.31	0.15
M Cnt	38	38	37	36	38	38	39	39	39	39	39	39	36
Max M	17.53	16.55	13.34	7.55	6.77	6.23	2.77	3.80	4.61	11.32	23.88	20.76	78.57
Maxyr	1959	1983	1971	1982	1959	1956	1954	1975	1978	1975	1983	1952	1983
MinM	0.31	1.23	0,24	0.87	0.67	0.31	0.0O	0.11	0.24	0.47	0.59	1.73	25.83
Minyr	1985	1964	1965	1956	1949	1951	1958	1967	1974	1983	1876	1985	1985
Avg M	7.78	7.00	6.12	3.53	2.72	2.20	1.11	1.27	1.73	4.45	8.57	9.42	85.82
M Std	5.00	3.71	3.39	1.72	1.41	1.31	0.76	0.96	1.10	3.30	4.72	5.18	10.81
M Skw	0.28	0.75	0.52	0.40	0,70	'1.07	0.61	0.81	0.69	0.70	0.79	0.62	-0.55
M Kur	1.85	2.60	2.27	2.28	3.02	3.73	*2,20*	2.53	2.64	2.17	4.08	2.11	3.83

Table A-6

Station SNOW CR WDW

Elevation 30.0 ft
Begin Date 1/1977

Location @ RM 0.8
End Date 12/90

Parameter Rain
Record Cnt 14 yr

Summary of Precipitation, in Inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	434	392	434	420	434	430	434	434	430	434	390	403	5069
Avg M	2.73	2.44	2.55	2.15	2.62	1,99	1.09	1.03	1.76	t.81	3.46	3.47	26.96

Washington Department of Wildlife, Snow Creek Gage

Monthly Precipitation Totals, in inches

	77	78	79	80	81	82	83	84	85	86	87	88	89
Jan	0.46	2.83	0.69	2.64	2,26	3,84	5.8	2.68	0.17	4.77	5.78	1.34	1.29
Feb	0.95	3.45	2.92	2.71	2.66	2,98	4.67	3.78	1.92	1.81	1.64	0.39	1.86
Mar	3.11	1.67	0.83	2.67	2.11	3.43	3.72	2.9	2.48	1.97	3.38	2.62	3.51
Apt	1.38	2.39	3.03	2.92	2.09	2.6	2.19	2.31	1.56	2.35	1.01	2.g6	0.9
May	4.21	2.44	1.67	2.15	2,73	0.7	2.76	4.43	1.62	2.89	1.61	2.69	3,67

Table A~7

Station CLALLAM BAY 1 NNE

id 1465
Elevation 30.0 ft
Begin Date 6/1948

Latitude 48:16:00
Longitude 124:15:00
End Date 6/1976

Parameter Snow
Coverage 95%
Record Cnt 26

Summary of Snowfall, in inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sop	Oct	NOV	Dec	Annual
D Cnt	626	636	661	720	713	719	713	713	690	743	720	731	9385
D Avg	0.17	0.05	0.03	0.0O	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.11	0.03
M Cnt	20	23	21	24	23	24	23	23	23	24	24	24	17
MaxM	33.60	10,00	12.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	4.00	36.10	40.40
Maxyr	1954	1962	1960	1960	1962	1976	1975	1975	1975	1957	1955	1964	1971
MIn M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MInw	1976	1676	1975	1976	1978	1976	1975	1975	1975	1975	1975	1975	1963
Avg M	5.32	1.33	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	3.18	13.46
M Std	10.08	2.65	3.10	0.02							1.02	8.03	13.67
M Skw	2.19	2.13	3.14	4.90							3.04	3.47	0.90
M Kur	5.27	5.62	8.96	20.24							8.90	12.12	2.08

Table A-8

Station ELWHA R S

Id 2548
Elevation 360.0 ff
Begin Date 6/1948

Latitude 48:02:00
Longitude 123:35:00
End Date 12/1986

Parameter Snow
Coverage 93%
Record Cnt 39

Summary of Snowfall, in inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
DCnt	933	1000	1085	1140	1139	1108	1178	1146	1170	1209	1136	1019	13243
DAv9	0.36	0.08	0.05	0.00	0.00	O.00	0.00	0.00	0.00	0.00	0.05	0.14	0.05
M Cnt	30	36	35	36	37	37	38	37	39	39	38	33	24
Max M	70.50	21.80	18.10	1.00	0.00	0.00	0.00	0.00	0.00	0.50	35.00	19.60	58.40
Maxyr	1950	1949	1962	1972	1953	1985	1986	1986	1986	1971	1985	1949	1949
MIn M	0.00	0.00	O.00	0.00	0.00	0,00	0.00	0.00	O.00	0.00	0.00	0.00	0.00
MInyr	1985	1984	1985	1986	1986	1985	1986	1986	1986	1986	1986	1986	1958
AvgM	11.17	2.05	1.83	0.03	0.00	0.00	0.00	0.00	0.00	0.01	1.83	4.20	17.83
M Std	16.67	4.10	4.02	0.17						0.08	5.81	6.19	16.77
M Skw	2.15	3.53	3.23	5.81						6.24	5.42	1.41	1.07
M Kur	8.51	18.29	11.10	28.84						35.15	28.64	3.12	2.68

Table A-9

Station SAPPHO 8 E

Id 7319
Elevation 760.0 ft
Begin Date6/1948

Latitude 48:04:00
Longitude 124:07:00
End Date 12/1986

Parameter Snow
Coverage 83%
Record Cnt 39

Summary of Snowfall in Inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
O Cnt	771	808	956	1080	1028	1029	1112	1085	1080	1131	991	818	11889
D Avg	0.32	0.10	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.14	0.05
M Cnt	25	28	30	35	33	34	36	35	36	36	33	27	13
MaxM	61.20	17.20	36.50	3.30	1.00	0.00	0.00	0.00	0.00	0.00	16.00	27,80	71.40
Maxyr	1969	1956	1956	1955	1968	1986	1986	1985	1986	1966	1964	1971	1971
MIn M	0.00	0.00	0.00	O.00	0.00	O.00	0.00	0.00	0.00	0.00	0.00	O.00	0.00
MInyr	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986
AvgM	9.66	2.63	4,30	0,15	0.03	0.00	O.00	0.00	0.00	0.00	0.99	4.15	26.89
M Std	16.69	5.04	9.57	0.63	0.17						3,19	8.00	25.16
M Skw	2.03	1.94	2.60	4.44	5.74						4.00	2,19	0.53
M Kur	5.19	4.65	7,29	18.90	29.18						16.10	5,75	1.55

Table A-10

Station SEQUIM 2 E

Id 7544
Elevation 50.0 ft
Begin Date 10/1980

Latitude 48:05:00
Longitude 123:03:00
End Date 12/1986

Parameter Snow
Coverage 85%
Record Cnt 7

Summary of Snowfall, In inches

	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	181	139	186	180	186	180	186	185	180	217	180	184	2185
D Avg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	O.G0	0.00
M Cnt	6	5	6	6	6	6	6	6	6	7	6	6	4
Max M	0.00	0.0(	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maxyr	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1985	1986
MIn M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mlnyr	1986	1984	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1983
AvgM	0.00	0.00	0.00	0.00									

Table A-11

Station QUILCENE 2 SW

Id 6846
Elevation 120.0 ft
Begin Date 6/1948

Latitude 47:49:00
Longitude 122:55:00
End Date 11/1986

Parameter Snow
Coverage 93%
ReCord Cnt **39**

Summary of Snowfall, In Inches

	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	920	950	1082	1076	1176	1137	1208	1205	1170	1209	1162	1007	13302
D Avg	0.16	0.05	0.02	0.00	0.00	0.00	0.00	O.00	O.00	0.00	0.02	0.08	0.02
M Cnt	30	34	35	36	38	38	39	39	39	39	39	33	23
Max M	29.00	19.20	8.00	1.00	O.00	0.00	O.00	O.00	O.00	O.00	12.00	23.50	38.50
Maxyr	1954	1949	1956	1961	1953	1986	1986	1986	1986	1986	1955	1964	1971
MIn M	0.00	0.00	O.00	0.00	0.00	0.00	0.00	0.00	0.00	O.00	O.00	O.00	0.00
Mlnyr	1984	1984	1986	1988	1986	1986	1986	1988	1986	1986	1986	1982	1963
AvgM	4.28	1.31	0.70	0.03	0.00	0.00	O.00	0.00	0.00	O.O0	0.68	2.58	10.75
M Std	7.84	3.61	1.73	0.17							2.24	5.66	11.21
M Skw	2.05	4,10	2.47	6.00							4.12	2.61	1.09
M Kur	5.20	18.12	6.59	32.16							17.95	7.88	2.70

Table A-12

Station CLALLAM SAY 1 NNE

Id	1465	Latitude 48:15:00	Parameter T Max
Elevation	30.0ff	Longitude 124:15:00	Coverage 95%
Begin Date 6/1948		End Date 6/1976	Record Cnt 29

Summary of Maximum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apt	May	dun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	837	782	825	833	862	862	868	867	821	836	808	836	10037
D Avg	44	47	49	53	57	60	63	63	63	57	51	47	55
M Cnt	27	27	26	28	28	29	28	28	27	27	27	27	23
Max M	50	54	53	56	**61**	64	66	66	70	63	56	50	57
Maxyr	1961	1968	1970	1951	1973	1958	1972	1967	1975	1952	1954	1952	1958
MIn M	34	41	43	48	53	58	59	60	59	53	44	41	52
Mlnyr	1950	1956	1976	1976	1950	1971	1955	1951	1950	1950	1955	1955	1950
M Std	4	0	3	2	2	2	2	I	3	2	2	3	

Table A-13

Station ELWHA R S

Id 2548
Elevation 360.0 ft
Begin Date 6,'1948

Latitude 40:02:00
Longitude 123:35:00
End Date 12/1986

Parameter T Max
Coverage 91%
Record Cnt 39

Summary of Maximum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	1037	1020	1108	1078	1101	1069	1169	1129	1102	1114	1062	1034	13021
D Avg	41	46	50	57	64	68	74	74	68	57	47	43	58
M Cnt	33	37	37	36	36	37	38	37	37	36	36	35	20
Max M	49	51	55	63	72	76	85	83	75	64	53	47	59
Maxyr	1953	1963	1981	1951	1958	1967	1958	1967	1957	1952	1949	1959	t961
MIn M	30	41	45	52	59	61	61	68	63	52	38	36	55
MInyr	1950	1956	1951	1972	1986	1983	1986	1975	1978	1982	1985	1983	1983
M Std	4	3	3	2	3	4	5	4	3	2	3		

Table A-14

Station SAPPHO 8 E

Id 7319
Elevation 760.0 lt
Begin Date 6/1948

Latitude 48:04:00
Longitude 124:07:00
End Date 12/1986

Parameter T Max
Coverage 82%
Record Cnt 39

Summary of Maximum Temperature, in degrees Fahrenheit

	Jan	Feb	Mat	Apr	May	Jun	Jul	Aug	Sop	Oct	Nov	Dec	Annual
D Cnt	927	916	973	1020	986	934	1080	1059	1065	1009	942	844	11755
D Avg	42	46	50	55	61	67	73	73	69	59	48	43	58
M Cnt	30	32	30	32	30	31	34	35	35	31	29	24	12
Max M	48	54	55	62	70	75	83	82	77	68	53	49	58
Maxyr	1961	1963	1965	1956	1958	1958	1958	1967	1974	1952	1976	1976	1976
MInM	33	39	42	49	54	57	66	66	93	54	39	38	65
MInyr	1950	1956	1955	1955	1974	1953	1956	1954	1959	1968	1985	1964	1971
M Std	4	3	3	3	4	5	4	4	4	3	3	3	1

Table A-15

Station SEQUIM 2 E

Id 7544
Elevation 50.0 ft
Begin Date 10/1980

Latitude 46:05:00
Longitude 123:03;00
End Date 12/1966

Parameter T Max
Coverage 89%
ReCord Cnt 7

Summary of Maximum Temperature, In degrees Fahrenheit

	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	186	16g	186	160	166	180	186	186	180	217	210	217	2283
D Avg	47	49	63	55	60	66	69	72	65	58	50	46	57
M Cnt	6	6	6	6	6	6	6	6	6	7	7	7	6
Max M	50	52	56	58	64	69	75	75	67	60	54	49	58
Maxyr	1988	1983	1981	1983	1983	1982	1985	1986	1982	1986	1981	1986	1981
Min M	43	46	51	53	59	63	65	69	64	57	41	40	56
Minyr	1985	1985	1985	1986	1986	1981	1986	1682	1983	1984	1985	1983	1985
M Std	4	2	2	2	2	2	3	2	1	1			

Table A-16

Station QUILCENE 2 SW

Id 6846
Elevation 120.0 ft
Begin Date 6/1948

Latitude 47:49:00
Longitude 122:55:00
End Date 12/1986

Parameter T Max
Coverage 95%
Record Cnt 39

Summary 01 Maximum Temperature, In degrees Fahrenheit

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
DCnt	1125	1040	1126	1060	1171	1137	1185	1188	1157	1163	1121	1147	13620
D Avg	43	49	53	60	67	71	77	77	72	61	50	44	61
M Cnt	37	38	37	36	38	38	39	39	39	39	39	38	34
Max M	50	56	60	67	74	78	88	86	81	66	56	50	64
Maxyr	1996	1963	1979	1951	1958	1982	1985	1967	1974	1974	1954	1958	1958
MIn M	32	43	48	55	60	65	71	69	62	58	43	38	57
Minyr	1950	1956	1955	1955	1962	1971	1977	1976	1978	1975	1985	1983	1955
M Std	4	3	3	3	3	4	4	4	4	2			

Table A-17

Station CLALLAM BAY 1 NNE

Id 1465
Elevation 30.0 ft
Begin Date 6/1948

Latitude 48:16:00
Longitude 124:15:00
End Date 6/1976

Parameter TM[n
Coverage 96%
Record Cnt 29

Summary of Minimum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	868	791	868	840	868	831	668	867	840	867	838	867	10213
D Avg	33	35	35	38	42	47	48	49	46	41	38	35	40
M Cnt	28	28	29	28	28	28	29	28	28	28	28	28	26
Max M	39	40	39	40	46	55	51	51	51	45	42	40	43
Maxyr	1953	1958	I968	1962	1967	1976	1972	1967	1967	1962	1954	1950	1967
MIn M	21	39	31	34	39	43	46	45	42	37	33	30	39
MInyr	1950	1949	1954	1973	1971	1951	1970	1973	1970	1949	1955	1968	1955
M Std	4	3	2	2	2	3	l	2	2	3	2	3	1

Table A-18

Station ELWHA R S

Id 2548
Elevation 360.0 ft
Begin Date 6/1948

Latitude 48:02:00
Longitude 123:35:00
End Date 12/1986

Parameter T Min
Coverage 92%
Record Cnt 39

Summary o1 Minimum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apt	May	Jun	Jul	Aug	Sop	Oct	Nov	Dec	Annual
DCnt	1045	1039	1114	1098	1106	1075	1166	1136	1124	1123	1078	1036	13120
D Avg	30	32	33	37	41	46	50	51	47	41	35	32	40
M Cnt	33	37	37	37	36	37	38	37	38	37	37	35	23
Max M	37	38	37	39	46	82	55	55	50	45	41	37	41
Maxyr	1953	1958	1983	1957	1957	1958	1958	1986	1974	1967	1949	1979	1953
MIn M	18	29	29	32	38	42	46	46	43	38	27	25	38
MInyr	1950	1956	1982	1972	1972	1976	1977	1973	1972	1977	1985	1983	1985
U Std	4	2	2	2	2	2	2	2	2	2	3		

Table A-19

Station SAPPHO 8 E

Id 7319
Elevation 760.0 ft
Begin Date 6/1948

Latitude 48:04:00
Longitude 124:07:00
End Date 12/1986

Parameter T Min
Coverage 82%
ReCord Cnt 39

Summary of Minimum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sop	Oct	Nov	Dec	Annual
D Cnt	923	910	971	1018	975	918	1078	1060	1042	949	951	836	11631
D Avg	32	34	34	37	41	48	49	50	47	41	36	33	40
M Cnt	30	31	29	32	3O	31	34	35	35	29	30	21	10
Max M	38	39	39	39	46	51	56	58	57	45	40	39	41
Maxyr	1983	1958	1986	1985	1983	1958	1953	1953	1952	1965	1954	1976	1978
Min M	15	28	29	32	37	42	45	46	43	38	29	29	38
Mlnyr	1950	1956	1955	1955	1955	1954	1969	1973	1970	1983	1985	1966	1971
M Std	5	3	8	2	2	2	2	3	3	2	3		

Table A-20

Station SEQUIM 2 E

Id	7544	Latitude 48:05:00		Parameter	T Mln
Elevation	50.0 ft	Longitude 123:03:00		Coverage 89%	
Begin Date 10/1980		End Date 12/1986		ReCord Cnt 7	

Summary of Minimum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apr	May	dun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	186	169	186	180	186	180	186	186	180	217	210	217	2283
D Avg	32	32	34	36	42	46	49	49	44	38	33	30	38
M Cnt	6	6	6	6	6	6	6	6	6	7	7	7	6
Max M	34	33	37	37	43	48	50	50	46	40	37	38	39
Maxyr	1986	1984	1988	1985	1981	1983	1983	1981	1982	1985	1983	1980	1986
MIn M	29	30	31	33	40	46	47	47	41	36	27	24	37
Minyr	1982	1985	1985	1982	1982	1986	1984	1985	1984	1983	1985	1983	1985
M Std	2	1	2	2	2	1	1	1	2	1	3		

Table A-21

Station QUILCENE 2 SW

Id	6846	Latitude 47:49:00		Parameter	T Mln
Elevation	120.0 ft	Longitude 122:55:00		Coverage 95%	
Begin Date 6/t 948		End Date 12/1986		ReCord Cnt 39	

Summary of Minimum Temperature, in degrees Fahrenheit

	Jan	Feb	Mar	Apr	May	dun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
D Cnt	1126	1034	1123	1056	1172	1128	1171	1182	1154	1157	1119	1146	13568
D Avg	30	32	34	37	42	47	50	50	45	39	35	32	40
M Cnt	37	38	37	36	38	38	38	39	39	39	37	38	31
Max M	36	38	38	39	46	52	52	52	50	43	39	37	41
Maxyr	1978	1958	1952	1978	1957	1969	1975	1948	1963	1967	1965	1950	1958
MIn M	17	27	29	34	38	44	48	44	42	35	30	24	37
Minyr	1950	1949	1955	1955	1955	1976	1954	1955	1984	1977	1955	1983	1955
M Std	4	3	2	2	2	2	1	2	2	2	2	3	

Appendix B. Slope Data Base and Channel Profiles

Appendix B. Slope Data Base and Channel Profiles

The slope data was obtained from the Slope overlays constructed for the Snow Creek and Pysht River watersheds. Cells on the slope overlay contain a 4-digit number, of which the first digit is the slope class and the remaining three digits the unique cell identification number. The minimum size of the areas delineated is 5 acres. The following key explains the information in the Slope database.

WRIA#:	Water Resource Inventory Area number
WATERSHED:	Name of subwatershed
SLOPE:	Slope class determined from USGS topographic map where, 1 = 0% to 5% 2 = 5% to 30% 3 = 30% to 65% 4 = 65% to 90% 5 = >90%
CELL:	Three digit ceil identification number
ACRES:	Measured size of area, in acres

Tables B-1 and B-2 contain the channel profile data for the mainstem Pysht River and Snow Creek, respectively.

SLOPE DATABASE

01/30/1991

WRIA	WATERSHED	SLOPE	CELL	ACRES
17	Snow	1	1	566
17	Snow	1	2	55
17	Snow	1	3	35
17	Snow	1	4	16
17	Snow	1	5	140
17	Snow	1	6	88
17	Snow	1	7	13
17	Snow	1	8	14
17	Snow	1	9	10
17	Snow	1	10	11
17	Snow	1	11	100
17	Snow	1	12	8
17	Snow	1	13	11
17	Snow	1	14	99
17	Snow	1	15	3
17	Snow	1	16	7

Total in Slope Class 1 = 1186

WRIA	WATERSHED	SLOPE	CELL	ACRES
17	Snow	2	1	317
17	Snow	2	2	11
17	Snow	2	3	281
17	Snow	2	4	291
17	Snow	2	5	8
17	Snow	2	6	10
17	Snow	2	7	295
17	Snow	2	8	4797
17	Snow	2	9	10
17	Snow	2	10	235
17	Snow	2	11	253
17	Snow	2	12	3
17	Snow	2	13	44
17	Snow	2	14	3
17	Snow	2	15	16
17	Snow	2	16	6
17	Snow	2	17	30
17	Snow	2	18	8
17	Snow	2	19	6
17	Snow	2	20	6
17	Snow	2	21	9
17	Snow	2	22	3
17	Snow	2	23	6
17	Snow	2	24	13
17	Snow	2	25	1577

WRIA	WATERSHED	SLOPE	CELL	ACRES
17	Snow	2	26	15
17	Snow	2	27	34
17	Snow	2	28	274
	Total in Slope Class 2 =			8561
17	Snow	3	1	20
17	Snow	3	2	126
17	Snow	3	3	1149
17	Snow	3	4	45
17	Snow	3	5	40
17	Snow	3	6	5
17	Snow	3	7	14
17	Snow	3	8	57
17	Snow	3	9	3
17	Snow	3	10	21
17	Snow	3	11	60
17	Snow	3	12	26
17	Snow	3	13	27
17	Snow	3	14	510
17	Snow	3	15	6
17	Snow	3	16	5
17	Snow	3	17	62
17	Snow	3	18	36
17	Snow	3	19	60
17	Snow	3	20	506
17	Snow	3	21	330
17	Snow	3	22	2
17	Snow	3	23	28
17	Snow	3	24	17
17	Snow	3	25	35
17	Snow	3	26	862
17	Snow	3	27	4
17	Snow	3	28	40
17	Snow	3	29	8
17	Snow	3	30	8
17	Snow	3	31	7
17	Snow	3	32	15
17	Snow	3	33	8
17	Snow	3	34	51
17	Snow	3	35	49
17	Snow	3	36	27
17	Snow	3	37	238
	Total in Slope Class 3 = 4507			

WRIA	WATERSHED	SLOPE	CELL	ACRES
17	Snow	4	1	26
17	Snow	4	2	2
17	Snow	4	3	23
17	Snow	4	4	16
17	Snow	4	5	5
17	Snow	4	6	6
17	Snow	4	7	10
17	Snow	4	8	2
17	Snow	4	9	18
17	Snow	4	10	12
17	Snow	4	11	10
17	Snow	4	12	2
17	Snow	4	13	8
17	Snow	4	14	2
17	Snow	4	15	145
		Total in Slope Class 4 =		287

Total Acres in Snow Creek watershed = 14541

WRIA	WATERSHED	SLOPE	CELL	ACRES
19	Pysht	1	1	11
19	Pysht	1	2	567
19	Pysht	1	3	20
19	Pysht	1	4	158
19	Pysht	1	5	35
19	Pysht	1	6	9
19	Pysht	1	7	22
19	Pysht	1	8	6
19	Pysht	1	9	120
19	Pysht	1	10	26
19	Pysht	1	11	13
19	Pysht	1	12	6
19	Pysht	1	13	14
19	Pysht	1	14	5
19	Pysht	1	40	10
19	Pysht	1	15	291
19	Pysht	1	16	27
19	Pysht	1	17	34
19	Pysht	1	18	40
19	Pysht	1	19	45
19	Pysht	1	20	90
19	Pysht	1	21	20
19	Pysht	1	22	25
19	Pysht	1	23	11
19	Pysht	1	24	11

WRIA	WATERSHED	SLOPE	CELL	ACRES
t~B~				
19	Pysht	1	25	178
19	Pysht	1	26	11
19	Pysht	1	27	333
19	Pysht	1	28	491
19	Pysht	1	29	9
19	Pysht	1	30	110
19	Pysht	1	31	362
19	Pysht	1	32	72
19	Pysht	1	33	8
19	Pysht	1	34	4
19	Pysht	1	35	6
19	Pysht	1	36	37
19	Pysht	1	37	85
19	Pysht	**1**	**38**	**3**
19	Pysht	1	39	6

Total in Slope Class 1 = 3331

19	Pysht	2	1	4
19	Pysht	2	2	19
19	Pysht	2	3	11
19	Pysht	2	4	60
19	Pysht	2	5	243
19	Pysht	2	6	153
19	Pysht	2	7	74
19	Pysht	2	8	1370
19	Pysht	2	9	34
19	Pysht	2	10	6
19	Pysht	2	11	8
19	Pysht	2	12	12
19	Pysht	2	13	18
19	Pysht	2	14	17
19	Pysht	2	15	5
19	Pysht	2	16	14
19	Pysht	2	17	18
19	Pysht	2	18	8
19	Pysht	2	19	3
19	Pysht	2	20	17
19	Pysht	2	21	13
19	Pysht	2	22	34
19	Pysht	2	23	48
19	Pysht	2	24	17
19	Pysht	2	25	9316
19	Pysht	2	26	34
19	Pysht	2	27	4

WRIA	WATERSHED	SLOPE	CELL	ACRES
19	Pysht	2	28	5
19	Pysht	2	29	19
19	Pysht	2	30	4
19	Pysht	2	31	19
19	Pysht	2	32	38
19	Pysht	2	33	140
19	Pysht	2	34	44
19	Pysht	2	35	4
19	Pysht	2	36	27
19	Pysht	2	37	21
19	Pysht	2	38	10
19	Pysht	2	39	128
19	Pysht	2	40	5
19	Pysht	2	41	51
19	Pysht	2	42	17
19	Pysht	2	43	13
19	Pysht	2	44	37
19	Pysht	2	45	24
19	Pysht	2	46	24
19	Pysht	2	47	38
19	Pysht	2	48	14
19	Pysht	2	49	37
19	Pysht	2	50	106
19	Pysht	2	51	11
19	Pysht	2	52	2
19	Pysht	2	53	5
19	Pysht	2	54	149
19	Pysht	2	55	14
19	Pysht	2	56	10
19	Pysht	2	57	65
19	Pysht	2	58	16
19	Pysht	2	59	14
19	Pysht	2	60	6
19	Pysht	2	61	6
19	Pysht	2	62	24
19	Pysht	2	63	3
19	Pysht	2	64	20
19	Pysht	2	65	64
19	Pysht	2	66	5
19	Pysht	2	67	66
19	Pysht	2	68	11
19	Pysht	2	69	37
19	Pysht	2	70	7
19	Pysht	2	71	120
19	Pysht	2	72	37
19	Pysht	2	73	9
19	Pysht	2	74	11
19	Pysht	2	75	2
19	Pysht	2	76	10
19	Pysht	2	77	302
19	Pysht	2	78	4
19	Pysht	2	79	5

WRIA	WATERSHED	SLOPE	CELL	ACRES
19	Pysht	2	80	51
19	Pysht	2	81	12
19	Pysht	2	82	18
19	Pysht	2	83	11
19	Pysht	2	84	12
19	Pysht	2	85	58
19	Pysht	2	86	5
19	Pysht	2	87	6
19	Pysht	2	88	5
19	Pysht	2	89	31
19	Pysht	2	90	5
19	Pysht	2	91	9
19	Pysht	2	92	6
19	Pysht	2	93	3
19	Pysht	2	94	4
19	Pysht	2	95	22
19	Pysht	2	96	5
19	Pysht	2	97	11
19	Pysht	2	98	40
19	Pysht	2	99	24
19	Pysht	2	100	17
19	Pysht	2	101	9
19	Pysht	2	102	26
19	Pysht	2	103	4
19	Pysht	2	104	10
19	Pysht	2	105	5
19	Pysht	2	106	14
19	Pysht	2	107	23
19	Pysht	2	108	8
19	Pysht	2	109	24
19	Pysht	2	110	38
19	Pysht	2	111	6
19	Pysht	2	112	6
19	Pysht	2	113	22
19	Pysht	2	114	11

Total in Slope Class 2 = 13981

19	Pysht	3	1	38
19	Pysht	3	2	10
19	Pysht	3	3	10
19	Pysht	3	4	5
19	Pysht	3	5	31
19	Pysht	3	6	3
19	Pysht	3	7	5
19	Pysht	3	8	5
19	Pysht	3	9	5
19	Pysht	3	10	4

WRIA	WATERSHED	SLOPE	CELL	ACRES
19	Pysht	3	11	132
19	Pysht	3	12	5
19	Pysht	3	13	32
19	Pysht	3	14	3
19	Pysht	3	15	63
19	Pysht	3	16	256
19	Pysht	3	17	537
19	Pysht	3	18	8
19	Pysht	3	19	12
19	Pysht	3	20	2
19	Pysht	3	21	37
19	Pysht	3	22	75
19	Pysht	3	23	8
19	Pysht	3	24	10
19	Pysht	3	25	166
19	Pysht	3	26	11
19	Pysht	3	27	93
19	Pysht	3	28	11
19	Pysht	3	29	120
19	Pysht	3	30	15
19	Pysht	3	31	10
19	Pysht	3	32	13
19	Pysht	3	33	11
19	Pysht	3	34	9
19	Pysht	3	35	18
19	Pysht	3	36	12
19	Pysht	3	37	11
19	Pysht	3	38	18
19	Pysht	3	39	21
19	Pysht	3	40	28
19	Pysht	3	41	142
19	Pysht	3	42	5714
19	Pysht	3	43	980
19	Pysht	3	44	685
19	Pysht	3	45	599
19	Pysht	3	46	290
19	Pysht	3	47	4
19	Pysht	3	48	4
19	Pysht	3	49	1
19	Pysht	3	50	3
19	Pysht	3	51	184
19	Pysht	3	52	7
19	Pysht	3	53	30
19	Pysht	3	54	19
19	Pysht	3	55	593
19	Pysht	3	56	502
19	Pysht	3	57	6
	Total in Slope Class 3 =			11626

WRIA	WATERSHED	SLOPE	CELL	ACRES
19	Pysht	4	1	60
19	Pysht	4	2	5
19	Pysht	4	3	3
19	Pysht	4	4	8
19	Pysht	4	5	5
19	Pysht	4	6	2
19	Pysht	4	7	4
19	Pysht	4	8	14
19	Pysht	4	9	5
19	Pysht	4	10	9
19	Pysht	4	11	10
19	Pysht	4	12	4
19	Pysht	4	13	4
19	Pysht	4	14	2
19	Pysht	4	15	6
19	Pysht	4	16	7
19	Pysht	4	17	2
19	Pysht	4	18	14
19	Pysht	4	19	5
19	Pysht	4	20	20
19	Pysht	4	21	10
19	Pysht	4	22	20
19	Pysht	4	23	2
19	Pysht	4	24	3
19	Pysht	4	25	24
19	Pysht	4	26	4
19	Pysht	4	27	5
19	Pysht	4	28	10
19	Pysht	4	29	2
19	Pysht	4	30	33
19	Pysht	4	31	6
19	Pysht	4	32	4
19	Pysht	4	33	8
19	Pysht	4	34	2
19	Pysht	4	35	8
19	Pysht	4	36	14
	Total in Slope Class 4 =			344

Total Acres in Pysht R watershed = 29282

Table B-1

PYSHT RIVER

Channel Profile - mainstem

Elevation	Increment feet	Total feet	River mile
0	0	0	0
40	27000	27000	5.1
80	17000	44O00	8.3
120	9000	530O0	10.0
160	4500	57500	10.9
200	3800	61300	11.6
240	2500	63800	12.1
280	2500	66300	12.6
320	600	66900	12.7
360	750	67650	12.8
400	500	68150	12.9
440	1000	69150	13.1
480	1500	70650	13.4
520	1500	72150	13.7
560	t000	73150	13.9
600	1750	74900	14.2
640	1500	76400	14.5
680	1500	77900	14.8
720	1600	79500	15.1
760	1250	80750	15.3
800	1500	82250	15.6
840	500	82750	15.7
880	500	83250	15.8
920	500	83750	15.9
960	500	84250	16.0
1000	50O	84750	16.1
1040	400	85150	16.1
1080	500	85650	16.2
1120	500	86150	16.3
1160	500	86650	16.4

Table B-2

SNOW CREEK

Channel Profile - mainstem

Elevation	Increment feet	Total feet	River mile
0	0	0	0
40	5500	55OO	1.0
80	4450	9950	1.9
120	3700	13650	2.6
160	3250	16900	3.2
200	3550	20450	3.9
240	1400	21850	4.1
280	2050	23900	4.5
320	11 00	250OO	4.7
360	2000	27000	5.1
400	1000	28O(3O	5.3
440	1000	29000	5.5
480	1000	3000O	5.7
520	1000	31000	5.9
560	1050	32050	6.1
600	1000	33050	6.3
640	900	33950	6.4
680	800	34750	6.6
720	100	34850	6.6
760	500	35350	6.7
800	550	35900	6,8
84O	500	36400	6.9
880	500	36900	7.0
920	800	37700	7.1
960	700	3840O	7.3
1000	700	39100	7.4
1040	1000	4O100	7.6
I080	500	4O6OO	7.7
1120	600	41200	7.8
1160	500	41700	7.9
1200	500	42200	8.0
1240	200	42400	8.0
1280	500	42900	8.1
1320	1000	43900	8.3
1360	5OO	444OO	8.4
1400	5OO	449O0	8.5
1440	75O	45650	8.6
1480	5OO	46150	8.7
1520	500	46650	8.8
1560	5OO	47150	8.9
1600	5OO	47650	9.0
1640	150	47800	9.1
1680	150	47950	9.1
1720	200	48150	9.1
1760	2O0	48350	9.2
I800	750	49100	9.3
1840	250	49350	9.3
1880	250	49600	9.4
1920	250	49850	9.4
1960	4OO	50250	9.5
2000	250	5O5O0	9.6
2040	5OO	5100O	9.7
2080	5OO	51500	9.8
2120	5OO	52O0O	9.8
2160	200	52200	9.9
2200	5OO	52700	10.0
2240	25O	52950	10.0
2280	25O	53200	10.1
2320	250	53450	10.1
236O	25O	53700	1o.2
2400	25O	53950	10.2
2440	25O	.542OO	i0.3
2480	25O	54450	10.3
2520	100	54550	10.3
256O	25O	54800	10.4
2600	25O	55050	10.4

Appendix C. Soils Database Description

Appendix C. Soils Database Description

The Soils data base reflects information described in the State Survey Report for the Ozette and Straits districts (WDNR, 1974). The State Soil Mapping Units are based on an average of the most common soil properties, climate characteristics, topographic features, etc., found on the soil unit. The Soils data base provides information from the State Soil Survey Report regarding natural and disturbed stability characteristics of each mapping unit. However, the data base does not include all rating categories listed in the report. Included in the Soils database are the following parameters:

WRIA#:	Water Resource Inventory Area number.
Subwatershed:	Name of study watershed.
Quad:	Name of USGS 7 1/2 minute quadrangle; "FS" indicates that the source of data is the Forest Service (see explanation p. C-3)
Map symbol:	State soil symbol number, as shown on Soil overlay.
Acres:	Area, as measured on Soil overlay.
Soil name:	State soil name.
Index Spp:	Dominant tree species.
Site index:	Reflects a measurement of forest quality based on the most commonly observed tallest tree species, and it's average height within a certain age.
Depth:	Average depth of mapping unit, in inches.
Drainage:	The natural drainage capacity of soils is determined by saturation frequency and duration during soil formation. Drainage capacity is defined by seven classes; excessively, somewhat excessively, well, moderately well, somewhat poorly, poorly, and very poorly drained. These classes describe the rate of water movement throughout the soil. Most of the soil mapping units in this study are either well or moderately well drained.

Nat Stab:	Natural slope stability refers to the undisturbed state of a slope under normal climatic circumstances. The natural slope is rated as stable or unstable based on significant problems with soil properties, underlying material, drainage, and natural slope failures (e.g, landslides). If no significant problems in any of the above factors are present the slope is deemed as stable. An unstable slope rating will be assigned if any or some of the above stated problems are found to occur in a natural slope.
Dist Stab:	Disturbed slope stability refers to slopes that have been impacted by human activities. These slopes are rated as stable if no significant stability problems arise as the result of road construction or timber harvesting. An unstable rating is based on the presence of slope related problems that can be overcome or minimized by applying current road construction technology and maintenance, or by implementing alternatives. Very unstable ratings are assigned to slope stability problems that cannot be entirely corrected by the application of current technology.
Rd Ero Haz:	The ratings of cut, fill and sidecast hazards due to road construction are based on the areas soil properties, underlying material behavior, steepness of slope, soil drainage, and seasonal wetness. If the area is relatively level this rating does not apply. Slight ratings for road construction hazards can be overcome with standard road construction methods, and moderate hazard ratings can be reduced or minimized. Severe hazard ratings can only be reduced by special road construction methods.
TH Ero Haz:	Timber harvest areas erosion potential is a result of water action on surface soils. The soil properties, rainfall, storm intensity, and slope interactions of an area define the amount of erosion that takes place. A low rating is assigned to an area where potential surface erosion is minimal. Medium ratings indicate that erosion potential is significant and extensive erosion can occasionally occur; however, this can be reduced through careful logging practices. High ratings are given to areas where widespread surface erosion may frequently occur unless logging practices that minimize disturbances are applied.

The western half of the Snow Creek watershed was not covered by the WDNR State Soil Survey. The Olympic National Forest Updated Soil Resource Inventory (SRI) was used to describe the soil characteristics on this portion of the watershed. The following description explains the interpretations used to fit the SRI information into the WDNR parameters:

example: *51d/22/B*

Map symbol: primary soil concept #/soil inclusion/slope class

soil modifiers:	d = dissected w = wetter than normal k = bedrock is conglomerate
slope class:	A= 0-5% B = 5 - 35% C = 35 - 65% D = >65%
Soil name:	predominant surface soil texture in the SRI
Nat stab:	"stable" if low or medium surface erosion and mass wasting ratings in the SRI "unstable" if high surface erosion or mass wasting ratings in the SRI
Dist stab:	"stable" if both surface erosion and mass wasting ratings are low in the SRI "unstable" if either of the surface erosion or mass wasting ratings are moderate in the SRI "very unstable" if either of the surface erosion or mass wasting ratings are high in the SRI
Rd Ero Haz:	determined from the secondary road construction recommendations in the SRI, where: · low = great flexibility in road specifications · moderate = some special construction techniques recommended · severe = roads not advised
Th Ero Haz:	determined from the logging system recommendations in the SRI, where: · low = ground-based or simple cable systems · medium = log suspension advised; erosion control measures moderately successful · high = full suspension required; erosion control projects require persistent efforts to be successful

Appendix D. Vegetation Database

Appendix D. Vegetation Database Description

The Vegetation overlay consists of numbered cells which delineate stand areas. Information pertaining to the vegetative characteristics of each of these cells is contained in the vegetation database for each watershed. Due to the large number of cells, each watershed has a separate database, but the formats of the databases are identical. The database contains the following information for each cell:

WRIA: Water Resource Inventory Area number

Sub: Study watershed name, where Py = Pysht and Sn = Snow

Stand: Cell number, from the Vegetation overlay

Type: Primary land use, where

O1 = residential/developed
02 = noncultivated pasture
03 = cultivated pasture
04 = gravel pit
05 = brush
06 = rock outcrop

10 = forest with no grazing
11 = forest with grazing
12 = powerline
13 = radio tower
14 = non-forested (unstocked)
15 = highway right-of-way

20 = wetland
21 = stream corridor
22 = lake
23 = tidal flats

Acres: Net acres of the cell, with ribbon acres (i.e., roads) subtracted out

YearOr: Year of origin

DomSpp:	Dominant species, where df = douglas fir ra = red alder tf = true fir wh = western hemlock ss = sitka spruce cs = cottonwood hd= mixed hardwoods cc = cedars pr = planned regeneration
SubSpp:	Subdominant species, blank if dominant greater than 80% by basal area
TPA:	Trees per acre
Owner:	Land owner, where 01 = Champion International Corporation 02 = Weyerhauser Company 03 = Washington Department of Natural Resources 04 = U.S. Forest Service 05 = Seaboard Lumber company 06 = Burlington Northern Corporation 07 = City of Tacoma 08 = Plum Creek Timber Company 09 = ITT Rayonier/Rayonier Timberlands 10 = Bloedel Timber 11 = Met-ill and Ring 12 = Pope Resources 13 = NDC Timber 14 = Travelers Timber Investments 15 = Small landowner (did not provide data) 16 = Cavenham
Legal:	Township, range, and section
ID:	Identification number assigned by the landowner
Comments:	"tpa is estimate" means that tpa was interpreted from stocking class codes, rather than a direct survey "aerial photo interp" means that the information was determined through use of aerial photos and extrapolation of data from adjacent and similar stands

Tables D-1 and D-2 are a list of the stands, according to type and year of origin, for the Pysht River and Snow Creek watersheds, respectively.

Riparian Vegetation

The Riparian database contains information from the Vegetation overlay that pertains to the corridor of the mainstem of Charley Creek and the Mashel River. The database includes the following parameters:

WRIA:	Water Resource Inventory Area number
Subwatershed:	Study watershed name, where Py = Pysht and Sn = Snow
Stand:	Number of the stand on vegetation overlay
Length:	Linear distance along stream corridor, in feet
Dom Spp:	Dominant species, where df = douglas-fir, wh = western hemlock, tf = true fir, and ra = red alder
Orig Year:	Year of origin

Tables D-3 and D-4 are listings from the Riparian database, sorted by year of origin, for the two study watersheds.

Table D-1. Pysht River - Year of Origin Report

Type	Stand	Year of Origin	Acres	Legal
6	49	0	0.4	31N13W36
14	129	0	1.5	31N12W28
14	182	0	8.0	31N12W26
14	201	0	25.0	31N12W34
20	233	0	10.0	31N12W10
23	286	0	260.0	31NllW09
1	305	0	28.0	31NllW08
4	341	0	22.0	31NllW18
4	397	0	6.0	31NllW19
4	441	0	5.0	31N12W12
1	457	0	240.0	31N12W13
1	459	0	40.0	31NllW07
1	485		7.0	30NllW18
20	499		0.5	31NllW28
20	500		0.7	31N12W24
20	501		0.9	31N12W24
20	502		0.5	31N12W24
20	503		1.4	31N12W09

Total Acres
656.9

Type	Stand	Year of Origin	Acres	Legal
10	237	1790	60.0	31N12W30
10	240	1790	26.0	31N12W30
10	247	1790	171.0	31N12W31
10	256	1790	144.0	31N12W32
10	268	1790	4.0	30N12W03
10	269	1790	7.0	30N12W03
10	272	1790	27.0	31N12W04
10	274	1790	20.0	31N12W04
10	276	1790	4.0	31N12W04
10	494	1790	133.0	30NllW19

Total Acres
596.0

Type	Stand	Year of Origin	Acres	Legal
10	492	1800	40.0	31N12W06

Total Acres
40.0

Table D-1. Continued

Type	Stand	Year of Origin	Acres	Legal
10	264	1810	1.0	30N12W04
10	266	1810	16.0	30N12W03

Total Acres
17.0

Type	Stand	Year of Origin	Acres	Legal
10	152	1824	35.0	31N12W21
10	154	1824	28.0	31N12W21

Total Acres
63.0

Type	Stand	Year of Origin	Acres	Legal
10	236	1860	11.6	31N12W30

Total Acres
11.6

Type	Stand	Year of Origin	Acres	Legal
10	140	1868	9.0	31N12W33
10	215	1868	2.0	31N12W33

Total Acres
11.0

Type	Stand	Year of Origin	Acres	Legal
10	277	1880	71.0	30NllW03
10	475	1880	164.0	30NllW03
10	478	1880	44.0	30NllW03
10	481	1880	35.0	30NllW03
10	482	1880	35.0	30NllW03
10	484	1880	17.0	30NllW03

Total Acres
366.0

Table D-1. Continued

Type	Stand	Year of Origin	Acres	Legal
10	231	1885	5.0	31N12W10

Total Acres
5.0

Type	Stand	Year of Origin	Acres	Legal
10	187	1888	48.0	31N12W26
10	203	1888	40.0	31N12W35

Total Acres
88.0

Type	Stand	Year of Origin	Acres	Legal
10	202	1890	2.0	31N12W34

Total Acres
2.0

Type	Stand	Year of Origin	Acres	Legal
10	86	1893	12.0	31N12W35

Total Acres
12.0

Type	Stand	Year of Origin	Acres	Legal
10	80	1894	20.0	31N12W35
10	213	1894	4.0	31N12W33
10	214	1894	2.0	31N12W33
10	216	1894	9.0	31N12W33
10	217	1894	22.0	31N12W33

Total Acres
57.0

Type	Stand	Year of Origin	Acres	Legal

Table D-1. Continued

10	180	1896	34.0	31N12W26
10	196	1896	3.0	31N12W27
10	197	1896	2.0	31N12W27
			Total Acres 39.0	

Type	Stand	Year of Origin	Acres	Legal
10	191	1898	16.0	31N12W26
10	192	1898	29.0	31N12W26
10	193	1898	1.0	31N12W26
10	195	1898	2.0	31N12W26
			Total Acres 48.0	

Type	Stand	Year of Origin	Acres	Legal
10	141	1900	53.0	31N12W33
10	176	1900	9.0	31N12W26
10	181	1900	10.0	31N12W26
10	183	1900	16.0	31N12W26
10	210	1900	4.0	31N12W34
10	317	1900	9.0	31NllW05
10	331	1900	5.0	31NllW06
10	342	1900	16.0	31NllW18
10	343	1900	5.0	31NllW17
10	414	1900	9.0	31N12W23
			Total Acres 136.0	

Type	Stand	Year of Origin	Acres	Legal
10	130	1901	60.0	31N12W32
10	133	1901	2.5	31N12W32
10	138	1901	2.0	31N12W32
			Total Acres 64.5	

Type	Stand	Year of Origin	Acres	Legal
10	205	1902	2.0	3tN12W35

Table D-1. Continued

Total Acres
2.0

Type	Stand	Year of Origin	Acres	Legal
10	122	1903	7.0	31N12W29
10	124	1903	7.0	31N12W29
10	143	1903	12.0	31N12W33
10	218	1903	13.0	31N12W33
10	220	1903	65.0	31N12W28
10	223	1903	22.0	31N12W27

Total Acres
126.0

Type	Stand	Year of Origin	Acres	Legal
10	454	1910	6.0	31NllW18

Total Acres
6.0

Type	Stand	Year of Origin	Acres	Legal
10	413	1911	27.0	31N12W23

Total Acres
27.0

Type	Stand	Year of Origin	Acres	Legal
10	242	1920	45.0	31N13W36
10	245	1920	37.0	31N12W30
10	253	1920	54.0	31N12W32
10	259	1920	148.0	31N12W32
10	262	1920	284.0	30N12W04
21	298	1920	60.0	31NllW09
10	431	1920	62.0	31N12W10

Total Acres
690.0

Type	Stand	Year of Origin	Acres	Legal

Table D-1. Continued

10	5	1921	18.6	30NllW06
10	30	1921	110.0	31N12W16
10	36	1921	13.0	31N12W16
10	38	1921	19.3	31N12W36
10	41	1921	60.0	31N12W16

Total Acres
220.9

Type	Stand	Year of Origin	Acres	Legal
10	297	1923	25.0	31NllW09

Total Acres
25.0

Type	Stand	Year of Origin	Acres	Legal
10	350	1925	91.0	31NllW17

Total Acres
91.0

Type	Stand	Year of Origin	Acres	Legal
10	153	1926	116.0	31N12W21
10	228	1926	1.0	31N12W21
10	432	1926	60.0	31N12W10
10	433	1926	36.0	31N12W03
10	434	1926	62.0	31N12W10

Total Acres
275.0

Type	Stand	Year of Origin	Acres	Legal
10	306	1928	48.0	31NllW08
10	307	1928	46.0	31NllW08
10	308	1928	29.0	31NllW08
10	425	1928	146.0	31N12W13

Total Acres
269.0

Table D-1. Continued

Type	Stand	Year of Origin	Acres	Legal
10	404	1929	11.0	31N12W26

Total Acres
11.0

Type	Stand	Year of Origin	Acres	Legal
10	15	1930	33.2	31NllW16
10	40	1930	55.0	31N12W16
10	172	1930	0.5	31N12W23
10	424	1930	68.0	31N12W14
10	426	1930	41.0	31N12W14
10	430	1930	21.0	31N12W10
10	442	1930	183.0	31NllW25

Total Acres
401.7

Type	Stand	Year of Origin	Acres	Legal
10	150	1931	15.0	31N12W21
10	312	1931	78.0	31NllW08

Total Acres
93.0

Type	Stand	Year of Origin	Acres	Legal
10	232	1932	6.0	31N12W10
10	234	1932	11.0	31N12W10
10	235	1932	10.0	31N12W10

Total Acres
27.0

Type	Stand	Year of Origin	Acres	Legal
10	185	1933	113.0	31N12W26
10	186	1933	1.0	31N12W26
10	188	1933	12.0	31N12W26
10	190	1933	35.0	31N12W26

Table D-1. Continued

10	194	1933	23.0	31N12W26
10	295	1933	34.0	31NllW09
10	351	1933	42.0	31NllW17
10	447	1933	32.0	31NllW18

Total Acres
292.0

Type	Stand	Year of Origin	Acres	Legal
10	344	1934	105.0	31NllW17
10	412	1934	65.0	31N12W23
10	416	1934	25.0	31N12W26
10	428	1934	60.0	31N12W14

Total Acres
255.0

Type	Stand	Year of Origin	Acres	Legal
21	116	1935	36.0	31N12W15
10	155	1935	59 0	31N12W22
10	230	1935	118 0	31N12W10
10	321	1935	75 0	31NllW05
10	405	1935	16 0	31N12W26
10	406	1935	56 0	31N12W23
10	427	1935	238 0	31N12Wll
10	462	1935	49 0	31N12W15
21	464	1935	6 0	31N12W22

Total Acres
653.0

Type	Stand	Year of Origin	Acres	Legal
10	81	1936	32.0	31N12W26
10	120	1936	25.0	31N12W29
10	301	1936	24.0	31NllW09
10	339	1936	155.0	31NllW07
10	410	1936	52.0	31N12W23
10	415	1936	2.0	31N12W23
10	429	1936	257.0	31N12W10

Total Acres
547.0

Table D-1. Continued

Type	Stand	Year of Origin	Acres	Legal
10	338	1937	244.0	31NllW07
10	352	1937	16.0	31NllW07
10	411	1937	8.0	31N12W23
10	436	1937	50.0	31N12Wll
10	438	1937	72.0	31N12W13
			Total Acres 390.0	

Type	Stand	Year of Origin	Acres	Legal
10	170	1938	78.0	31N12W23
10	328	1938	140.0	31NllW06
10	356	1938	66.0	31NllW20
10	437	1938	52.0	31N12W12
			Total Acres 336.0	

Type	Stand	Year of Origin	Acres	Legal
10	167	1939	4.0	31N12W14
10	439	1939	11.0	31N12W13
			Total Acres 15.0	

Type	Stand	Year of Origin	Acres	Legal
10	1	1940	6.3	30NllW06
10	2	1940	119.5	30NllW06
10	3	1940	7.8	30NllW06
10	6	1940	60.0	30N12W01
10	7	1940	65.0	30N12W01
10	8	1940	7.2	30N12W01
10	9	1940	46.0	30N12W01
10	10	1940	50.0	30N12W01
10	13	1940	96.0	31NllW16
10	17	1940	22.1	31NllW16
10	18	1940	10.7	31NllW18
10	20	1940	85.4	31NllW16
10	23	1940	75.2	31NllW16
10	24	1940	15.9	31NllW16
10	26	1940	40.2	31NllW34

Table D-1. Continued

10	37	1940	105.0	31N12W36
10	42	1940	111.0	31N12W36
10	43	1940	160.7	31N12W36
10	50	1940	59.0	32N12W36
10	75	1940	80.0	31NllW19
10	76	1940	40.0	31NllW19
10	110	1940	9.0	31N12W15
10	279	1940	8.0	31NllW03
10	280	1940	31.0	31NllW03
10	283	1940	130.0	31NllW04
10	287	1940	235.0	31NllW04
10	288	1940	26.0	31NllWl0
10	290	1940	80.0	31NllW15
10	296	1940	40.0	31NllW09
10	310	1940	54.0	31NllW08
10	330	1940	161.0	31N12W12
10	340	1940	276.0	31NllW07
10	376	1940	32.0	31NllW29
10	380	1940	68.0	31NllW27
10	383	1940	25.0	31NllW26
10	388	1940	384.0	31NllW30
10	389	1940	2.0	31NllW29
10	392	1940	384 0	31NllW30
10	396	1940	190 0	31N12W25
10	399	1940	88 0	31N12W13
10	400	1940	702 0	31N12W25
10	402	1940	238 0	31N12W24
21	420	1940	42 0	31N12W14
10	423	1940	5 0	31N12W14
10	440	1940	49 0	31N12W12
10	446	1940	2O 0	31NllW18
10	448	1940	18 0	31NllW18
10	458	1940	44.0	31NllW18
10	460	1940	120.0	31N12W24
10	469	1940	98.0	31NllW34
10	470	1940	7.0	31NllW21
10	490	1940	42.0	31N12W13
10	491	1940	80.0	31N12W13
10	495	1940	27.0	31NllW19
10	496	1940	80.0	31NllW19

Total Acres
5058.0

Type	Stand	Year of Origin	Acres	Legal
10	323	1941	135.0	31NllW32
10	325	1941	167.0	31NllW31
10	395	1941	96.0	31NllW31
10	467	1941	282.0	31NllW31
10	468	1941	167.0	31NllW31

Table D-1. Continued

Total Acres
847.0

Type	Stand	Year of Origin	Acres	Legal
10	145	1942	84.0	31N12W33
10	149	1942	35.0	31N12W21
10	156	1942	67.0	31N12W22
10	326	1942	89.0	31NllW06
10	353	1942	108.0	31NllW17
10	360	1942	90.0	31NllW20
10	364	1942	17.0	31NllW21

Total Acres
490.0

Type	Stand	Year of Origin	Acres	Legal
10	212	1943	36.0	31N12W33
10	324	1943	307.0	31NllW32

Total Acres
343.0

Type	Stand	Year of Origin	Acres	Legal
10	123	1944	79.0	31N12W29
10	134	1944	60.0	31N12W32
10	175	1944	152.0	31N12W22
10	355	1944	15o0	31NllW17

Total Acres
306.0

Type	Stand	Year of Origin	Acres	Legal
10	77	1945	15.0	31N12W35
10	78	1945	15.0	31N12W35
10	105	1945	68.0	31N12W15
10	127	1945	238.0	31N12W29
10	166	1945	5.0	31N12W22
10	169	1945	24.0	31N12W23
10	171	1945	13.0	31N12W23
21	293	1945	25.0	31NllW16

Table D-1. Continued

10	319	1945	6.0	31NllW04
10	465	1945	40.0	31N12W27
10	466	1945	152.0	31N12W34
10	471	1945	1860.0	30NllW05
10	473	1945	30.0	30NllW05
10	489	1945	40.0	31N12W14
10	493	1945	8.0	31N12W33
10	497	1945	2.0	31N12W26
10	498	1945	3.0	31N12W26
			Total Acres 2544.0	

Type	Stand	Year of Origin	Acres	Legal
10	51	1946	73.0	31NllW27
10	52	1946	145.0	31NllW28
10	53	1946	7.0	31NllW34
10	54	1946	1.0	31NllW34
10	55	1946	1.0	31NllW34
10	56	1946	6.0	31NllW34
10	57	1946	77.0	31NllW33
10	58	1946	16.0	31NllW33
10	59	1946	618.0	31NllW33
10	60	1946	73.0	31NllW33
10	61	1946	612.0	31NllW32
10	62	1946	94.0	31NllW28
10	63	1946	57.0	31NllW29
10	64	1946	3.5	31NllW29
10	65	1946	32.0	31NllW29
10	66	1946	8.0	31NllW29
10	67	1946	177.0	31NllW31
10	68	1946	18.5	31NllW30
10	69	1946	59.0	31NllW31
10	70	1946	4.0	31NllW31
10	71	1946	13.0	31NllW38
10	114	1946	30.0	31N12W15
10	278	1946	18 0	31NllW03
10	281	1946	98 0	31NllW03
10	372	1946	329 0	31NllW28
10	377	1946	91 0	31NllW34
10	379	1946	63 0	31NllW34
10	386	1946	3 0	31NllW26
10	387	1946	3 0	31NllW26
10	391	1946	150 0	31NllW30
			Total Acres 2880.0	

Type	Stand	Year of Origin	Acres	Legal

Table D-1. Continued

10	90	1947	121.0	31N12W30
10	198	1947	147.0	31N12W27
10	362	1947	32.0	31NllW20

Total Acres
300.0

Type	Stand	Year of Origin	Acres	Legal
10	318	1949	26.0	31NllW04

Total Acres
26.0

Type	Stand	Year of Origin	Acres	Legal
10	4	1950	157.0	30NllW06
10	73	1950	13.0	31NllW34
10	79	1950	12.0	31N12W26
10	82	1950	55.0	31N12W35
10	87	1950	30.0	30N12W06
10	92	1950	57.0	31N12W29
10	104	1950	37.0	31N12W15
10	206	1950	9.0	31N12W35
10	207	1950	10.0	31N12W35

Total Acres
380.0

Type	Stand	Year of Origin	Acres	Legal
10	151	1953	213.0	31N12W21
10	160	1953	10.0	31N12W22

Total Acres
223.0

Type	Stand	Year of Origin	Acres	Legal
10	74	1955	8.0	31NllW34
10	103	1955	41.0	31N12W15
10	452	1955	18.0	31NllW18

Table D-1. Continued

Total Acres
67.0

Type	Stand	Year of Origin	Acres	Legal
10	96	1956	15.0	31N12W20

Total Acres
15.0

Type	Stand	Year of Origin	Acres	Legal
10	12	1958	22.0	30N13W01
10	44	1958	1.0	31N13W36
10	46	1958	66.0	31N13W36
21	48	1958	1.8	31N13W36

Total Acres
90.8

Type	Stand	Year of Origin	Acres	Legal
10	83	1960	35.0	31N12W35
10	246	1960	75.0	31N12W30
10	249	1960	117.0	31N12W31
10	254	1960	46.0	31N12W32
10	263	1960	35.0	30N12W04
10	271	1960	22.0	30N12W04

Total Acres
330.0

Type	Stand	Year of Origin	Acres	Legal
10	135	1961	1.0	31N12W32

Total Acres
1.0

Type	Stand	Year of Origin	Acres	Legal
10	309	1962	10.0	31NllW08
10	348	1962	13.0	31NllW17

Table D-1. Continued

Total Acres
23.0

Type	Stand	Year of Origin	Acres	Legal
10	84	1966	37.0	31N12W35
10	85	1966	5.0	31N12W35

Total Acres
42.0

Type	Stand	Year of Origin	Acres	Legal
10	329	1968	11.0	31NllW06

Total Acres
11.0

Type	Stand	Year of Origin	Acres	Legal
10	91	1970	4 0	31N12W30
10	238	1970	53 0	31N12W30
10	241	1970	190 0	31N12W30
10	244	1970	32 0	31N12W30
10	251	1970	13 0	31N12W31
10	252	1970	59 0	31N12W31
10	261	1970	96 0	30N12W04
10	299	1970	28 0	31NllW09
10	300	1970	16 0	31NllW09
10	327	1970	53 0	31NllW06
10	354	1970	19 0	31NllW17
10	378	1970	10 0	31NllW27
10	486	1970	24 0	30NllW18

Total Acres
597.0

Type	Stand	Year of Origin	Acres	Legal
10	94	1971	18.0	31N12W29

Total Acres
18.0

Table D-1. Continued

Type	Stand	Year of Origin	Acres	Legal
10	89	1972	27.0	31N12W30
			Total Acres 27.0	

Type	Stand	Year of Origin	Acres	Legal
10	100	1973	9.0	31N12W21
10	313	1973	7.0	31NllW08
			Total Acres 16.0	

Type	Stand	Year of Origin	Acres	Legal
10	289	1975	12.0	31NllW10
10	294	1975	44.0	31NllW09
10	479	1975	55.0	30NllW03
10	483	1975	150.0	30NllW03
			Total Acres 261.0	

Type	Stand	Year of Origin	Acres	Legal
10	11	1976	3.0	30N13W01
10	47	1976	12.0	31N13W36
10	97	1976	2.0	31N12W20
			Total Acres 17.0	

Type	Stand	Year of Origin	Acres	Legal
10	435	1977	25.0	31N12W10
			Total Acres 25.0	

Type	Stand	Year of Origin	Acres	Legal

Table D-1. Continued

10	19	1978	38.4	31NllW17
10	21	1978	18.9	31NllW18
10	25	1978	34.4	31NllW16
10	88	1978	58.0	31N13W25
10	345	1978	11.0	31NllW17

Total Acres
160.7

Type	Stand	Year of Origin	Acres	Legal
10	14	1979	16.7	31NllW16
10	311	1979	15 0	31NllW08
10	320	1979	59 0	31NllW05
10	332	1979	7 0	31NllW06
10	346	1979	11 0	31NllW17
10	349	1979	26 0	31NllW17
10	450	1979	11 0	31NllW18
10	455	1979	29 0	31NllW18

Total Acres
174.7

Type	Stand	Year of Origin	Acres	Legal
10	99	1980	24.0	31N12W21
10	158	1980	14.0	31N12W22
10	248	1980	31.0	31N12W31
10	255	1980	38.0	31N12W31
10	265	1980	28.0	30N12W03
10	267	1980	2.0	30N12W03
10	273	1980	31.0	31N12W04
10	275	1980	5.0	31N12W04
10	316	1980	35.0	31NllW05
10	334	1980	8.0	31N12W01
10	335	1980	1.5	31N12W01
10	336	1980	20.0	31N12W01

Total Acres
237.5

Type	Stand	Year of Origin	Acres	Legal
10	35	1981	57.1	31N12W09
10	163	1981	8.0	31N12W22
10	369	1981	46.0	31NllW28
10	370	1981	45.0	31NllW21

Table D-1. Continued

10	373	1981	58.0	31NllW27
10	374	1981	64.0	31NllW27
10	375	1981	36.0	31NllW27

Total Acres
314.1

Type	Stand	Year of Origin	Acres	Legal
10	16	1982	49.7	31NllW16
10	93	1982	11.0	31N12W20
10	179	1982	14.0	31N12W27

Total Acres
74.7

Type	Stand	Year of Origin	Acres	Legal
10	111	1983	7.5	31N12W15
10	119	1983	6.0	31N12W19
10	224	1983	36.0	31N12W27
10	284	1983	13.0	31NllW04

Total Acres
62.5

Type	Stand	Year of Origin	Acres	Legal
10	72	1984	12.0	31NllW34
10	98	1984	30.0	31N12W29
10	315	1984	58.0	31NllW05
10	358	1984	32.0	31NllW20
10	363	1984	40°0	31NllW21
10	365	1984	93.0	31NllW28
10	366	1984	82.0	31NllW29
10	368	1984	29.0	31NllW28

Total Acres
376.0

Type	Stand	Year of Origin	Acres	Legal
10	31	1985	3.5	31N12W09
10	32	1985	3.0	31N12W09
10	33	1985	4.5	31N12W09

Table D-1. Continued

10	34	1985	9.8	31N12W09
10	45	1985	3.0	31N13W36
10	148	1985	54.0	31N12W28
10	162	1985	7.0	31N12W22
10	165	1985	24.0	31N12W22
10	173	1985	56.0	31N12W23
10	200	1985	85.0	31N12W34
10	209	1985	27.0	31N12W34
10	219	1985	102.0	31N12W28
10	239	1985	44.0	31N13W36
10	243	1985	6.0	31N12W30
10	250	1985	61.0	31N12W31
10	257	1985	140.0	31N12W32
10	258	1985	37.0	31N12W32
10	260	1985	36.0	30N12W05
10	270	1985	42.0	31N12W31
10	314	1985	91.0	31NllW05
10	359	1985	38.0	31NllW20
10	367	1985	44.0	31NllW28
10	371	1985	25.0	31NllW28
10	381	1985	23.0	31NllW27
10	382	1985	88.0	31NllW27
10	407	1985	38.0	31N12W23
10	408	1985	26.0	31N12W23
10	472	1985	36.0	30NllW03
10	474	1985	46.0	30NllW03
10	476	1985	15.0	30NllW03
10	477	1985	22.0	30NllW03
10	480	1985	60.0	30NllW03
10	487	1985	10.0	30NllW18
10	488	1985	3.0	30NllW18

Total Acres
1309.8

Type	Stand	Year of Origin	Acres	Legal
10	22	1986	88.0	31NllW16
10	107	1986	13.0	31N12W15
10	109	1986	23.0	31N12W15
10	113	1986	1.5	31N12W15
10	121	1986	35.0	31N12W29
10	126	1986	195.0	31N12W29
10	128	1986	217.0	31N12W28
10	131	1986	19.0	31N12W28
10	142	1986	39.0	31N12W33
10	144	1986	112.0	31N12W28
10	146	1986	9.0	31N12W33
10	147	1986	186.0	31N12W28
10	174	1986	45.0	31N12W22
10	177	1986	62.0	31N12W27

Table D-1. Continued

10	184	1986	34.0	31N12W26
10	221	1986	35.0	31N12W34
10	292	1986	35.0	31NllW15
10	357	1986	132.0	31NllW20
10	361	1986	163.0	31NllW20
10	419	1986	13.0	31N12W14
10	444	1986	72.0	31NllW19
10	463	1986	74.0	31N12W22
			Total Acres 1602.5	

Type	Stand	Year of Origin	Acres	Legal
10	101	1987	59.0	31N12W21
10	106	1987	5.0	31N12W15
10	108	1987	27.0	31N12W15
10	112	1987	15.0	31N12W15
10	115	1987	21.0	31N12W15
10	125	1987	71.0	31N12W29
10	136	1987	90	31N12W32
10	137	1987	90	31N12W32
10	139	1987	29 0	31N12W32
10	157	1987	25 0	31N12W22
10	159	1987	20 0	31N12W22
10	164	1987	51 0	31N12W22
10	189	1987	8O	31N12W26
10	199	1987	46 0	31N12W02
10	204	1987	94.0	31N12W35
10	211	1987	77.0	31N12W33
10	322	1987	32.0	31NllW04
10	398	1987	211.0	31NllW19
10	418	1987	65.0	31N12W14
10	422	1987	25.0	31N12W14
10	449	1987	21.0	31NllW18
10	451	1987	11.0	31NllW18
			Total Acres 931.0	

Type	Stand	Year of Origin	Acres	Legal
10	28	1988	1.6	31NllW16
10	39	1988	77.0	31N12W09
10	132	1988	85.0	31N12W28
10	161	1988	13.0	31N12W22
10	208	1988	170.0	31N12W34
10	222	1988	45.0	31N12W27
10	225	1988	75.0	31N12W27

Table D-1. Continued

10	229	1988	34.0	31N12W22
10	291	1988	10.0	31NllW15
10	347	1988	6.0	31NllW17
10	394	1988	52.0	31NllW19
10	445	1988	44.0	31NllW19
10	453	1988	6.0	31NllW18
10	456	1988	25.0	31NllW18

Total Acres
643.6

Type	Stand	Year of Origin	Acres	Legal
10	27	1989	5.5	31NllW16
10	29	1989	23.0	31NllW16
10	95	1989	30.0	31N12W29
10	168	1989	36.0	31N12W14
10	282	1989	111.0	31NllW05
10	285	1989	71.0	31NllW09
10	304	1989	57.0	31NllW08
10	333	1989	12.0	31NllW06
10	337	1989	59.0	31NllW07
10	384	1989	68°0	31NllW26
10	385	1989	57.0	31NllW26
10	390	1989	164.0	31NllW30
10	403	1989	87.0	31N12W26
10	409	1989	24.0	31N12W23
10	417	1989	37.0	31N12W14
10	421	1989	15.0	31N12W14
10	443	1989	52.0	31NllW19

Total Acres
908.5

Type	Stand	Year of Origin	Acres	Legal
10	102	1990	39.0	31N12W21
10	117	1990	63.0	31N12W15
10	118	1990	83.0	31N12W15
10	178	1990	20.0	31N12W27
10	226	1990	4.0	31N12W21
10	227	1990	2.0	31N12W21
10	302	1990	98.0	31NllW08
10	303	1990	28.0	31NllW09
10	393	1990	91.0	31NllW30
10	401	1990	44.0	31N12W25
10	461	1990	111.0	31N12W15

Total Acres

Table D-1. Continued

583.0

Total Acres
29282.0

Table D-2. Snow Creek - Year of Origin Report

Type	Stand	Year of Origin	Acres	Legal
1	339	0	8.0	29N02W36
1	429		115.0	28N02W12
1	432		15.0	28N02W12
1	433		12.0	28N02W14
1	434		80.0	28N02W14
1	443		13.0	28N02W15
1	448		21.0	28N02W15
1	456		12.0	29N02W24
1	460		20.0	29N02W25
1	461		116.0	29N02W25
1	463		75.0	29N02W36
1	465		56.0	28N02W01
1	466		49.0	28N02W01
1	468		5.0	28N02W01
1	471		60.0	29N02W25
1	423		10.0	29N02W36
1	455		10.0	29N02W25
4	113	0	6.0	28N02W06
4	151	0	5.0	28N02W10
4	482		3.0	28N01W07
5	379	0	3.0	28N02W16
5	381	0	3.0	28N02W16
6	267	0	5.0	28N02W16
12	86	0	25.0	
12	408	0	9.0	28N02W01
12	416	0	19 0	29N01W30
12	417	0	68 0	29N01W30
12	457		6 0	29N02W24
15	453		30 0	29N02W25
15	454		180 0	28N02W01
15	477		10 0	28N01W06
20	89	0	6 0	28N01W18
20	94	0	1 0	28N03W01
20	324	0	16 0	28N02W22
20	359	0	8 0	28N02W04
20	385	0	3.0	28N02W23
22	325	0	9.0	28N02W23
22	430		82.0	28N02W12
23	452		8.0	29N02W24

Total Acres
1182.0

Type	Stand	Year of Origin	Acres	Legal
10	215	1750	8.0	28N03W12
10	216	1750	8.0	28N03W12

Table D-2. Continued

10	302	1750	4.0	28N03Wll

Total Acres
20.0

Type	Stand	Year of Origin	Acres	Legal
10	115	1880	12.0	28N02W05
10	131	1880	47.0	28N02W06
10	138	1880	4.0	28N03W01
10	142	1880	12.0	28N02W06
10	145	1880	55.0	28N02W06
10	146	1880	64.0	28N02W05
10	153	1880	2.0	28N03W01
10	155	1880	3.0	28N03W01
10	160	1880	10.0	28N02W07
10	163	1880	50.0	28N02W04
10	164	1880	66°0	28N02W04
10	167	1880	2°0	28N02W08
10	182	1880	1.0	28N02W08
10	184	1880	268 0	28N02W08
10	185	1880	10 0	28N02W09
10	187	1880	1 0	28N03W01
10	204	1880	13 0	28N02W08
10	205	1880	3 0	28N02W09
10	206	1880	3 0	28N02W09
10	208	1880	2.0	28N02W09
10	220	1880	68.0	28N02W07
10	221	1880	8.0	28N02W08
10	228	1880	5.0	28N02W08
10	229	1880	2.0	28N02W08
10	230	1880	16.0	28N02W09
10	232	1880	13.0	28N02W09
10	236	1880	19.0	28N03W12
10	238	1880	18.0	28N03W12
10	254	1880	13.0	28N02W17
10	257	1880	7.0	28N02W09
10	258	1880	27.0	28N02W08
10	259	1880	35.0	28N02W09
10	262	1880	60.0	28N02W09

Total Acres
919.0

Type	Stand	Year of Origin	Acres	Legal
10	8	1894	10.0	29N02W35

Total Acres

Table D-2. Continued

10.0

Type	Stand	Year of Origin	Acres	Legal
10	373	1900	142.0	28N02W02
10	375	1900	52.0	28N02W02
10	387	1900	45.0	28N02W23
10	390	1900	3.0	28N02W23

Total Acres
242.0

Type	Stand	Year of Origin	Acres	Legal
10	233	1905	7 0	28N03W12
10	235	1905	37 0	28N03W12
10	237	1905	16 0	28N03W12
10	271	1905	45 0	28N03W12
10	272	1905	15 0	28N03W12
10	298	1905	17 0	28N03W12

Total Acres
137.0

Type	Stand	Year of Origin	Acres	Legal
10	66	1908	16.0	28N02W15

Total Acres
16.0

Type	Stand	Year of Origin	Acres	Legal
10	90	1909	6.0	28N03W01
10	91	1909	64.0	28N03W01
10	92	1909	44.0	28N03W01

Total Acres
114.0

Type	Stand	Year of Origin	Acres	Legal
10	93	1910	21.0	28N03W01

Table D-2. Continued

10	98	1910	10.0	29N02W31
10	99	1910	18.0	28N02W06

Total Acres 49.0

Type	Stand	Year of Origin	Acres	Legal
10	227	1915	8.0	28N02W08
10	256	1915	35.0	28N02W08

Total Acres 43.0

Type	Stand	Year of Origin	Acres	Legal
10	263	1918	10.0	28N02W16

Total Acres 10.0

Type	Stand	Year of Origin	Acres	Legal
10	135	1920	2.0	28N03W01
10	140	1920	2.0	28N03W01
10	150	1920	12.0	28N02W09
10	177	1920	16.0	28N03W12
10	186	1920	16.0	28N02W09
10	192	1920	21.0	28N03W12
10	196	1920	9.0	28N02W07
10	217	1920	32.0	28N03W12
10	239	1920	12.0	28N03W12
10	255	1920	12.0	28N02W08
10	293	1920	81.0	28N02W18
10	301	1920	15.0	28N03Wll
10	309	1920	28.0	28N03W13
10	392	1920	9.0	28N02W13
10	395	1920	11.0	28N02W13
10	397	1920	25.0	28N02W13
10	400	1920	12.0	28N02W12
10	404	1920	66.0	28N02W12
10	405	1920	1.0	28N02W12
10	407	1920	52.0	28N02W01
10	410	1920	32.0	28N02W01
10	415	1920	21.0	29N01W30
10	418	1920	119.0	29N01W30
10	419	1920	135.0	29N02W25

Table D-2. Continued

10	420	1920	130.0	29N02W25
10	421	1920	38.0	29N02W25
10	422	1920	110.0	29N02W36
10	426	1920	12.0	28N02W01
10	428	1920	20.0	28N02W12
10	450	1920	41.0	28N02W09
10	462	1920	36.0	29N02W36
10	469	1920	8.0	28N02W01

Total Acres
1136.0

Type	Stand	Year of Origin	Acres	Legal
10	18	1923	7.0	29N02W34

Total Acres
7.0

Type	Stand	Year of Origin	Acres	Legal
10	101	1925	32.0	28N02W05
10	226	1925	35.0	28N02W17

Total Acres
67.0

Type	Stand	Year of Origin	Acres	Legal
10	14	1926	31.0	29N02W35
10	17	1926	56.0	29N02W35
10	20	1926	8.0	29N02W34
10	24	1926	7.0	29N02W34
10	25	1926	5.0	29N02W34

Total Acres
107.0

Type	Stand	Year of Origin	Acres	Legal
10	26	1927	4.0	29N02W35
10	63	1927	27.0	28N02W15
10	103	1927	30.0	28N02W05
10	104	1927	22.0	28N02W04
10	106	1927	18.0	28N02W04

Table D-2. Continued

10	124	1927	28.0	28N02W04
10	147	1927	28.0	28N02W05
10	162	1927	53.0	28N02W07
10	181	1927	52.0	28N02W07
10	451	1927	110.0	28N02W09

Total Acres
372.0

Type	Stand	Year of Origin	Acres	Legal
10	55	1928	10.0	28N02W15
10	116	1928	32.0	28N02W05
10	133	1928	21.0	28N02W05
10	166	1928	9.0	28N02W08
10	183	1928	7.0	28N02W08
10	200	1928	30.0	28N02W08
10	201	1928	13.0	28N02W08
10	202	1928	21.0	28N02W08
10	203	1928	22.0	28N02W08

Total Acres
165.0

Type	Stand	Year of Origin	Acres	Legal
10	68	1929	17.0	28N02W15
10	69	1929	17.0	28N02W15
10	110	1929	167.0	28N02W06
10	198	1929	86.0	28N02W07
10	199	1929	41.0	28N02W08
10	261	1929	14.0	28N02W09

Total Acres
342.0

Type	Stand	Year of Origin	Acres	Legal
10	10	1930	13.0	29N02W35
10	15	1930	17.0	29N02W35
10	50	1930	17.0	28N02W10
10	53	1930	4.0	28N02W15
10	61	1930	34.0	28N02W15
10	64	1930	18.0	28N02W15
10	65	1930	19.0	28N02W15
10	75	1930	6.0	28N02W14
10	76	1930	41.0	28N02W14

Table D-2. Continued

10	102	1930	27.0	28N02W05
10	112	1930	37.0	28N02W06
10	117	1930	30.0	28N02W05
10	118	1930	5.0	28N02W05
10	119	1930	17.0	28N02W05
10	120	1930	8.0	28N02W09
10	123	1930	10.0	28N02W04
10	129	1930	3.0	28N02W06
10	134	1930	6.0	28N02W05
10	148	1930	7.0	28N02W08
10	149	1930	6.0	28N02W09
10	152	1930	9.0	28N02W09
10	161	1930	10.0	28N02W07
10	165	1930	19.0	28N02W05
10	168	1930	9.0	28N02W09
10	169	1930	10.0	28N02W09
10	180	1930	52.0	28N02W07
10	193	1930	16.0	28N02W07
10	194	1930	39.0	28N02W07
10	251	1930	6.0	28N02W17
10	260	1930	16.0	28N02W09
10	282	1930	1.0	28N02W18
10	284	1930	26.0	28N02W18
10	285	1930	8.0	28N02W19
10	286	1930	14.0	28N02W19
10	356	1930	11.0	28N02W04
10	357	1930	4.0	28N02W04
10	358	1930	24.0	28N02W04
10	360	1930	86.0	28N02W04
10	361	1930	65.0	28N02W04
10	362	1930	4.0	28N02W04
10	364	1930	80.0	28N02W03
10	368	1930	24.0	28N02W03
10	371	1930	226.0	28N02W02
10	384	1930	277.0	28N02W16
10	386	1930	69.0	28N02W23
10	391	1930	6.0	28N02W13
10	393	1930	60.0	28N02W13
10	394	1930	16.0	28N02W13
10	396	1930	6.0	28N02W13
10	399	1930	2.0	28N02W13
10	401	1930	2 0	28N02W12
10	402	1930	62 0	28N02W12
10	409	1930	7 0	28N02W01
10	411	1930	22 0	28N02W01
10	412	1930	3 0	28N02W01
10	413	1930	52 0	28N02W01
10	424	1930	139 0	29N01W31
10	425	1930	70 0	28N02W01
10	427	1930	12 0	28N02W12
10	435	1930	14 0	28N02W14
10	446	1930	95 0	28N02W21
10	449	1930	9 0	28N02W09

Table D-2. Continued

10	458	1930	4.0	29N02W24
10	459	1930	20.0	29N02W25

Total Acres
2031.0

Type	Stand	Year of Origin	Acres	Legal
21	316	1920	12.0	28N02W09
21	317	1920	20.0	28N02W10

Total Acres
32.0

Type	Stand	Year of Origin	Acres	Legal
10	344	1931	4.0	29N02W36
10	345	1931	3.0	29N02W36
10	346	1931	5.0	29N02W36

Total Acres
12.0

Type	Stand	Year of Origin	Acres	Legal
21	464	1920	44.0	29N02W01

Total Acres
44.0

Type	Stand	Year of Origin	Acres	Legal
10	9	1932	6.0	29N02W35
10	12	1932	6.0	29N02W35
10	47	1932	10.0	28N02W10
10	52	1932	116.0	28N02W10
10	57	1932	9.0	28N02W15
10	59	1932	8.0	28N02W15
10	60	1932	6.0	28N02W15
10	67	1932	12.0	28N02W15
10	73	1932	11.0	28N02W14
10	74	1932	12.0	28N02W14
10	88	1932	14.0	28N01W07
10	328	1932	50.0	28N02W14
10	330	1932	8.0	28N02W14

Table D-2. Continued

10	331	1932	12.0	28N02W14
10	333	1932	12.0	28N02W14
10	336	1932	30.0	28N02W14
10	338	1932	2.0	28N02W14
10	437	1932	103.0	28N02W14
10	438	1932	57.0	28N02W14

Total Acres
484.0

Type	Stand	Year of Origin	Acres	Legal
10	48	1933	5.0	28N02W10
10	49	1933	21.0	28N02W10
10	51	1933	26.0	28N02W10
10	54	1933	88.0	28N02W15
10	326	1933	18.0	28N02W22
10	327	1933	35.0	28N02W22
10	347	1933	6.0	29N02W36
10	348	1933	3.0	29N02W36
10	349	1933	4.0	29N02W36
10	350	1933	20.0	29N02W36
10	354	1933	10.0	29N02W36

Total Acres
236.0

Type	Stand	Year of Origin	Acres	Legal
10	11	1934	10.0	29N02W35
10	13	1934	15.0	29N02W35
10	23	1934	23.0	29N02W35
10	34	1934	18.0	28N02Wll
10	71	1934	32.0	28N02W14
10	77	1934	17.0	28N02W14
10	78	1934	11.0	28N02W14

Total Acres
126.0

Type	Stand	Year of Origin	Acres	Legal
10	36	1935	13.0	28N02Wll
10	38	1935	4.0	28N02Wll
10	39	1935	13.0	28N02Wll
10	100	1935	11.0	28N02W05
10	207	1935	10.0	28N02W09

Table D-2. Continued

10	222	1935	44.0	28N02W18
10	231	1935	11.0	28N02W09
10	243	1935	6.0	28N02W18
10	244	1935	21.0	28N02W18
10	246	1935	7.0	28N02W18
10	250	1935	197.0	28N02W17
10	252	1935	14.0	28N02W17
10	253	1935	54.0	28N02W17
10	374	1935	37.0	28N02W02

Total Acres
442.0

Type	Stand	Year of Origin	Acres	Legal
10	31	1936	64 0	28N02Wll
10	44	1936	21 0	28N02Wll
10	45	1936	41 0	28N02W10
10	341	1936	30 0	29N02W36
10	352	1936	4 0	29N02W36
10	472	1936	60 0	29N02W36

Total Acres
220.0

Type	Stand	Year of Origin	Acres	Legal
10	72	1937	6.0	28N02W14

Total Acres
6.0

Type	Stand	Year of Origin	Acres	Legal
10	197	1938	72.0	28N02W07

Total Acres
72.0

Type	Stand	Year of Origin	Acres	Legal
10	329	1939	25.0	28N02W14
10	332	1939	15.0	28N02W14
10	335	1939	6.0	28N02W14
10	343	1939	30.0	29N02W36

Table D-2. Continued

Total Acres
76.0

Type	Stand	Year of Origin	Acres	Legal
10	7	1940	30.0	29N02W35
10	27	1940	17.0	28N02Wll
10	265	1940	58.0	28N02W16
10	266	1940	3.0	28N02W16
10	269	1940	46.0	28N02W16
10	280	1940	59.0	28N02W18
10	281	1940	5.0	28N02W18
10	287	1940	12.0	28N02W19
10	288	1940	7.0	28N02W19
10	289	1940	10.0	28N02W19
10	291	1940	6.0	28N02W18
10	292	1940	62.0	28N02W19
10	294	1940	43.0	28N02W18
10	300	1940	18.0	28N03W13
10	308	1940	91.0	28N03W13
10	310	1940	66.0	28N03W13
10	311	1940	21.0	28N03W13
10	321	1940	25.0	28N02W02
10	323	1940	35 0	28N02W02
10	363	1940	23 0	28N02W03
10	365	1940	14 0	28N02W03
10	369	1940	23 0	28N02W03
10	370	1940	18 0	28N02W03
10	372	1940	12 0	28N02W03
10	376	1940	22.0	28N02W02
10	377	1940	2.0	28N02W16
10	378	1940	7.0	28N02W16
10	380	1940	16.0	28N02W16
10	382	1940	14.0	28N02W16
10	383	1940	4.0	28N02W16
10	388	1940	1.0	28N02W23
10	431	1940	105.0	28N02W13
10	436	1940	9.0	28N02W14
10	442	1940	7.0	28N02W15
10	444	1940	16.0	28N02W15
10	445	1940	7.0	28N02W15
10	447	1940	14.0	28N02W15
10	484	1940	15.0	29N02W26

Total Acres
943.0

Table D-2. Continued

Type	Stand	Year of Origin	Acres	Legal
10	264	1941	7.0	28N02W16
10	268	1941	28.0	28N02W16
10	270	1941	10.0	28N02W16

Total Acres
45.0

Type	Stand	Year of Origin	Acres	Legal
10	96	1945	70.0	28N03W01
10	127	1945	15.0	28N03W01
10	195	1945	101.0	28N02W07
10	219	1945	43.0	28N02W07
10	240	1945	42.0	28N02W07
10	241	1945	20.0	28N02W07
10	242	1945	23.0	28N02W18
10	274	1945	12.0	28N03W12
10	275	1945	29.0	28N03W13
10	276	1945	9.0	28N03W13
10	279	1945	31.0	28N02W18
10	296	1945	27.0	28N03W13
10	297	1945	130.0	28N03W12
10	303	1945	33.0	28N03W12
10	305	1945	10.0	28N03W13
10	307	1945	60.0	28N03W13
10	313	1945	32.0	28N03W13
10	314	1945	4.0	28N03W13

Total Acres
691.0

Type	Stand	Year of Origin	Acres	Legal
10	366	1946	31.0	28N02W03

Total Acres
31.0

Type	Stand	Year of Origin	Acres	Legal
10	4	1950	10.0	29N02W35
10	225	1950	8.0	28N02W17
10	299	1950	8.0	28N03W13
10	304	1950	20.0	28N03W13

Table D-2. Continued

10	306	1950	4.0	28N03W13
10	312	1950	11.0	28N03W13
10	467	1950	88.0	28N02W01

Total Acres
149.0

Type	Stand	Year of Origin	Acres	Legal
21	5	1940	3.0	29N02W35
21	28	1940	14.0	28N02Wll
21	29	1940	2.0	28N02Wll
21	30	1940	46.0	28N02Wll
21	40	1940	6.0	28N02Wll
21	58	1940	10.0	28N02W15
21	70	1940	27.0	28N02W14
21	441	1940	59.0	28N02W15

Total Acres
167.0

Type	Stand	Year of Origin	Acres	Legal
21	337	1941	10.0	28N02W14

Total Acres
10.0

Type	Stand	Year of Origin	Acres	Legal
10	128	1955	101.0	28N03W01
10	139	1955	15.0	28N03W01
10	157	1955	6.0	28N03W12
10	178	1955	12.0	28N03W12
10	273	1955	37 0	28N03W12
10	277	1955	13 0	28N03W13
10	278	1955	14 0	28N02W16
10	283	1955	5O	28N02W18
10	295	1955	40 0	28N03W13
10	351	1955	90	29N02W36

Total Acres
252.0

Table D-2. Continued

Type	Stand	Year of Origin	Acres	Legal
10	107	1957	1.0	28N03W02
10	108	1957	84.0	28N03W01
10	109	1957	80.0	28N03W01
			Total Acres 165.0	

Type	Stand	Year of Origin	Acres	Legal
10	367	1960	6.0	28N02W03
			Total Acres 6.0	

Type	Stand	Year of Origin	Acres	Legal
10	191	1963	7.0	28N03W12
			Total Acres 7.0	

Type	Stand	Year of Origin	Acres	Legal
10	213	1966	40.0	28N03W12
10	214	1966	6.0	28N03W12
10	355	1966	38.0	29N01W31
			Total Acres 84.0	

Type	Stand	Year of Origin	Acres	Legal
10	342	1967	122.0	29N02W36
			Total Acres 122.0	

Type	Stand	Year of Origin	Acres	Legal
10	158	1968	6.0	28N03W12

Table D-2. Continued

Type	Stand	Year of Origin	Acres	Legal
10	159	1968	4.0	28N02W07
10	179	1968	4.0	28N02W07

Total Acres
14.0

Type	Stand	Year of Origin	Acres	Legal
10	156	1969	9.0	28N03W12

Total Acres
9.0

Type	Stand	Year of Origin	Acres	Legal
10	176	1970	2.0	28N03W12

Total Acres
2.0

Type	Stand	Year of Origin	Acres	Legal
10	290	1971	29.0	28N02W19

Total Acres
29.0

Type	Stand	Year of Origin	Acres	Legal
10	389	1972	3.0	28N02W23

Total Acres
3.0

Type	Stand	Year of Origin	Acres	Legal
10	126	1974	11.0	28N03W01
10	154	1974	41.0	28N03W01

Total Acres
52.0

Table D-2. Continued

Type	Stand	Year of Origin	Acres	Legal
10	79	1975	40.0	28N02W13
10	474	1975	21.0	28N02W01

Total Acres
61.0

Type	Stand	Year of Origin	Acres	Legal
10	84	1977	19.0	28N01W07

Total Acres
19.0

Type	Stand	Year of Origin	Acres	Legal
10	22	1978	34.0	29N02W35
10	81	1978	10.0	28N01W06
10	82	1978	5.0	28N01W06
10	83	1978	46.0	28N01W07

Total Acres
95.0

Type	Stand	Year of Origin	Acres	Legal
10	105	1979	10.0	28N02W04
10	121	1979	15.0	28N02W09
10	122	1979	6.0	28N02W04

Total Acres
31.0

Type	Stand	Year of Origin	Acres	Legal
10	16	1980	96.0	29N02W35
10	80	1980	4.0	28N01W06
10	85	1980	18.0	28N01W07
10	87	1980	54.0	28N01W07
10	439	1980	77.0	28N02W15
10	475	1980	11.0	28N02W01

Total Acres

Table D-2. Continued

260.0

Type	Stand	Year of Origin	Acres	Legal
10	172	1981	13.0	28N03W01
10	189	1981	6.0	28N03W01
10	212	1981	17.0	28N03W12
10	334	1981	30.0	28N02W14

Total Acres
66.0

Type	Stand	Year of Origin	Acres	Legal
10	43	1982	11.0	28N02Wll
10	414	1982	56.0	28N02W01

Total Acres
67.0

Type	Stand	Year of Origin	Acres	Legal
10	97	1983	30.0	29N02W31
10	111	1983	4.0	28N02W06
10	114	1983	37.0	28N02W05

Total Acres
71.0

Type	Stand	Year of Origin	Acres	Legal
10	33	1984	21.0	28N02Wll
10	42	1984	4.0	28N02Wll
10	95	1984	2.0	28N03W01

Total Acres
27.0

Type	Stand	Year of Origin	Acres	Legal
10	56	1985	13.0	28N02W15
10	136	1985	45.0	28N03W01
10	137	1985	9.0	28N03W01

Table D-2. Continued

10	170	1985	12.0	28N03W01
10	315	1985	370.0	28N02W10
10	318	1985	300.0	28N02W10
10	470	1985	40.0	28N02W01
10	476	1985	20.0	28N02W01
10	478	1985	19.0	28N01W06
10	479	1985	8.0	28N01W06
10	480	1985	22.0	28N01W07
10	481	1985	26.0	28N01W07
10	473	1985	67.0	28N02W01

Total Acres
951.0

Type	Stand	Year of Origin	Acres	Legal
10	19	1986	7 0	29N02W34
10	62	1986	17 0	28N02W15
10	125	1986	26 0	28N03W01
10	130	1986	8 0	28N02W06
10	132	1986	24 0	28N02W05
10	143	1986	28 0	28N02W06
10	144	1986	50 0	28N02W06
10	209	1986	9 0	28N03W01
10	210	1986	3 0	28N03W12
10	440	1986	17 0	28N02W15

Total Acres
189.0

Type	Stand	Year of Origin	Acres	Legal
10	35	1987	83.0	28N02Wll
10	37	1987	19.0	28N02Wll
10	171	1987	19.0	28N03W01
10	173	1987	16.0	28N03W12
10	188	1987	16.0	28N03W01
10	211	1987	3.0	28N03W12
10	234	1987	5.0	28N03W12
10	319	1987	178.0	28N02W10
10	398	1987	35.0	28N02W13
10	403	1987	136.0	28N02W12
10	406	1987	50.0	28N02W12

Total Acres
560.0

Table D-2. Continued

Type	Stand	Year of Origin	Acres	Legal
10	32	1988	109.0	28N02Wll
10	41	1988	31.0	28N02Wll
10	224	1988	21.0	28N02W18
10	248	1988	2.0	28N02W17
10	249	1988	10.0	28N02W17

Total Acres
173.0

Type	Stand	Year of Origin	Acres	Legal
10	1	1989	10.0	29N02W35
10	2	1989	11.0	29N02W35
10	3	1989	4.0	29N02W35
10	6	1989	5.0	29N02W35
10	21	1989	43.0	29N02W35
10	141	1989	26.0	28N02W06
10	174	1989	2.0	28N03W12
10	175	1989	21.0	28N03W12
10	190	1989	33.0	28N03W12
10	218	1989	13.0	28N03W12
10	223	1989	38.0	28N02W18
10	245	1989	6.0	28N02W18
10	247	1989	4.0	28N02W18
10	483	1989	8.0	29N02W26

Total Acres
224.0

Type	Stand	Year of Origin	Acres	Legal
10	46	1990	115.0	28N02W10
10	320	1990	18.0	28N02W02
10	322	1990	42.0	28N02W02
10	340	1990	32.0	29N02W36
10	353	1990	40.0	29N02W36

Total Acres
247.0

14541.0

Appendix E. Miscellaneous Features

Appendix E. Miscellaneous Features

The Miscellaneous Features database and overlay contain information on features found within the watersheds that were not described in the other databases. These features include the gaging station on Charley Creek and landslides in the upper Mashel River watershed. The following parameters are included in the database:

WRIA:	Water Resource Inventory Area number
Subwatershed:	Study area watershed
Cell:	Number shown on the Miscellaneous Features overlay
Name:	Type of feature
Acres:	Area of feature, as measured on map
Orig_Year:	Year of origin
Status:	Active, static, or healing condition; a qualitative observation
Info_source:	Source of information: field verified or interpreted from aerial photos, etc.

Comments 1,2,3: Additional comments describing the feature

The following is a list of the miscellaneous features and some of the descriptive parameters included in the database.

Miscellaneous Features

PYSHT RIVER WATERSHED

CELL#	FEATURE	ACRES	ORIGIN	STATUS
1	landslide	3	pre-1990	active
2	fillslope failure	2	pre 1990	healing
3	mass wasting	3	pre 1990	healing
4	mass wasting	1	pre 1990	active
5	mass wasting	1	pre 1990	active
6	Site A		1989	
7	Site B		1989	
8	site C		1989	
9	Site D		1989	
10	Site E		1989	
11	site F		1989	
12	Site G		1989	
13	site H		1989	
14	Site I		1989	
15	crest gage		1989	
16	crest gage		1989	
17	crest gage		1989	
18	crest gage		1989	
19	crest gage		1989	

SNOW CREEK WATERSHED

CELL#	FEATURE	ACRES	ORIGIN	STATUS
1	mass wasting	20	pre-1957	healing
2	mass wasting	2	pre-1957	healing
3	mass wasting	10	pre-1957	healing
4	debris slide	8	pre-1957	healing
5	debris slide	4	pre-1957	healing
6	mass wasting	10	pre-1957	healing
7	debris slide	2	pre-1957	healing
8	USGS gaging station		t952	inactive
9	WDW gaging station		1977	active
10	mass wasting	1	1980-85	active
11	mass wasting	1	1980-85	active
12	mass wasting	1	1980-85	active
13	cutslope erosion	1	1990-911	active
14	fillslope failure	1	winter, 1990-91	active